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ANTOINE (R.). **Cane diseases.**—*Rep. Sug. Ind. Res. Inst. Mauritius, 1958*, pp. 55–65, 3 fig., 2 graphs, 1 map, [1959].

As regards chlorotic streak virus [cf. **37**, p. 594] the island can be roughly divided into an infected and a disease-free zone, the disease being prevalent in areas with more than 50 in. rain/annum. The virus cannot be found in latent form in stalks growing in a dry zone, which could therefore be used for planting as an alternative to heat-treated cane. There are indications that the disease is soil transmitted [cf. **37**, p. 309] and that leachate from contaminated soil is infective.

All commercial vars. are susceptible to [sugarcane] ratoon stunting [virus], M 134/32 being the most affected, with a reduction of 1·2 tons sugar/acre in plant canes. Ebène 1/37, believed resistant, appeared susceptible in 2 trials, whereas the leading var. M 147/44 showed moderate susceptibility only, especially in high rainfall areas. M 134/32, even after heat treatment, is inferior in the sub-humid area to B 37172, M 147/44, and M 31/45. Gibberellic acid did not improve germination of setts, heat-treated or not, and had no effect on the rate of growth and final stand, but caused some distortion of young shoots.

Fiji virus disease in Madagascar [**35**, p. 720], as a result of intensive control measures, decreased in the area of Brickaville and elsewhere. Trials showed H 37–1933 and Pindar to be highly resistant, but as the former proved very susceptible to *Xanthomonas albilineans* in Madagascar, Pindar is preferred.

A severe outbreak of an apparently new strain of gumming disease (*X. vasculorum*) [**35**, p. 634] is reported from Réunion. M 147/44, B 34104, R 397 (the main var. in Réunion), and progeny from Co. 281 were susceptible, though all have proved resistant to this disease in Mauritius. In addition *Thysanolaena maxima* [cf. **27**, p. 234] was observed as an additional host of the pathogen in Réunion.

ROBINSON (R. A.). **Sugar Cane smut.**—*E. Afr. agric. J.*, **24**, 4, pp. 240–243, 1 fig., 1959.

Sugarcane smut (*Ustilago scitaminea*) [map 79], first officially diagnosed in Kenya in 1958, though suspected there in 1956, is now known to occur in 5 localities in Nyanza and 1 in Coast Province. The symptoms of the disease are briefly described, and control measures are discussed under the headings: quarantine, eradication, clean planting material, rotation, and resistant vars. The paper concludes with a review of the factors affecting losses.

WANG (C. S.) & WANG (M. H.). **Studies on the downy mildew disease (Sclerospora sacchari Miyake) of Sugarcane.**—*J. agric. Ass. China, 1958*, 22, pp. 51–62, 1958. [Chinese, with English summary. *Hort. Abstr.*, **29**, 2, p. 360, 1959.]

Experiments at the Tsungyeh Sugar Improvement Station, China, showed that successful control of downy mildew (*S. sacchari*) [map 21] was obtained by immersion of diseased single-eye or 2-eye setts in water at 45° C. for 1 hr., followed by drying at room temp. for 24 hr.; then re-immersion at 52° for 1 hr., or 55° for ½ hr. Both methods improved germination and growth rate. In field tests fortnightly applications of karathane (0·2%) or Bordeaux (4:4:50) or weekly applications of phygon kept plants free from infection.

BEAUCHAMP (CHARLOTTE). **La constitution auxinique des Tabacs, sains ou virosés.** [The auxin content of healthy and virus-affected Tobacco plants.]—*Rev. gén. Bot.*, **65**, 774–775, pp. 477–517, 15 graphs, 1958. [63 ref.]

In further work [cf. **36**, p. 428], using chromatograms examined by ultra-violet

light, the author demonstrated that in White Burley tobacco plants 5 constituents are present in variable amounts whatever the physiological state of the plants, i.e. in healthy plants, those mechanically inoculated with tobacco mosaic virus (a few with potato virus X) [cf. **38**, p. 35], or plants deficient in chlorophyll (albinos). A small quantity of indole-3-acetic acid was always present, as well as scopoletin [loc. cit.], and a substance thought to be chlorogenic acid. Of 2 unknown fractions (*A* and *F*) *A*, which greatly accelerated the elongation of sections of *Avena* coleoptiles, may be the same as Kefford's α fraction (*J. exp. Bot.*, **6**, pp. 129, 245, 1955). During the incubation of tobacco mosaic virus, *A* appeared to become partially transformed into an inhibitor, Ph, which was possibly of a phenolic nature. Indole-3-acetic declined in plants inoculated with tobacco mosaic virus. Scopoletin, scarce in extracts from healthy plants, was considerably more abundant in albino plants and in plants affected by tobacco mosaic virus.

Free scopoletin is a normal constituent of the tobacco plant, the amount present varying widely according to its physiological condition. The marked increase in pathological conditions suggests that there may be an eventual relationship between excess scopoletin and the poor growth of diseased plants. In disagreement with the results of Andreae & Andreae [cf. **28**, p. 537] the author found that *in vitro*, on chromatograms exposed to diffused light, scopoletin acted as a photosensibilisator of the destruction of auxin; apparently *in vivo* the accumulation of scopoletin in leaf tissues affected by pathological conditions causes an increased destruction of indole-3-acetic acid.

Chlorogenic acid (if the identification is confirmed) is, in the light of the author's findings, a normal constituent of healthy tobacco plants.

Chadueli (M. D.). Зависимость между репродукцией вируса Табачной мозаики и дыханием растения. [Correlation between reproduction of Tobacco mosaic virus and plant respiration.]—Труд. Инст. Защ. Раст. А. Н. Груз. ССР [*Trud. Inst. Zashch. Rast. Acad. Nauk Gruz. S.S.R.*], **12**, pp. 23–30, 1957. [Russian summary. Abs. in *Referat. Zh. Biol., 1959*, 7, p. 207, 1959.]

Inoculation of tobacco, *Nicotiana glutinosa*, and hybrids between them with tobacco mosaic virus [**37**, p. 508] resulted within the 1st few days in an increase in respiration followed by a temporary decrease and a further increase. The intensity of respiration was greater in young leaves where virus conc. was high than in old ones where virus reproduction had ceased, or in healthy leaves. In the final stages of the disease at the end of vegetative growth respiration in all infected leaves was less than in healthy ones. There appears to be a direct correlation between intensity of respiration and synthesis of virus proteins.

Hill (A. V.). **Occurrence, spread and severity of blue mould, Peronospora tabacina Adam, of Tobacco in field plants.**—*J. Aust. Inst. agric. Sci.*, **25**, 1, pp. 55–58, 1 diag., 3 graphs, 1959.

In plots of 270 tobacco plants at Canberra, grown either in partial shade or unshaded, a central group of 18 plants in the shaded block was spray-inoculated with conidia of *P. tabacina* [**37**, p. 510], the natural infection which ensued in the unshaded plants being similarly supplemented. One week after the appearance of primary lesions the fewest/unit area were on the upper leaves of all plants in both blocks. This distribution persisted even when individual plants were spray-inoculated and maintained in humid conditions, thus it appeared that the chances of the green, upper leaves becoming infected were less than for the lower. The role of wind in the spread of the disease was obvious [cf. **37**, p. 376]. It was apparent that the chances of lesions developing on any particular group of leaves were modified by the rate of growth of the leaves, N nutrition, and leaf maturity. The disease spread to all the plants in approximately 21 days after its first appearance in each

block. Destructive spread of the pathogen occurred only in leaves which had not reached full size at sporulation [**37**, p. 680]. The severity of an attack was of the same order in leaves of similar physiological age, but economic loss varied with plant height at the time of attack and the duration of conditions favouring the disease.

MINEV (K.). **Investigation into the biology of Tobacco powdery mildew (Erysiphe cichoracearum DC.).**—*Ann. Fac. Phil. Skoplje*, Sect. Agric., **10**, pp. 5–57, 1956–7. [Abs. in *Bull. sci. Conseil Acad. Yugosl.*, **4**, 4, pp. 119–120, 1959.]

Great damage (up to 100%) to Macedonian tobacco crops in 1956–7 by *E. cichoracearum* [**34**, p. 346] is reported from the Faculty of Agriculture and Forestry, Skoplje. Disease spread is at a min. at 7° C., opt. at 23°, and max. at 32°. Germinated conidia survive to —3°. Conidia germinate from 20% R.H. upwards, the opt. being 66–86%, but saturated atmosphere and water drops are detrimental. Diffuse daylight is favourable, direct sunlight detrimental. Incubation period is 3–4 days for conidia, 4–5 days for ascospores. Watering favours the disease; priming of the lower 3 or 4 leaves does not delay it; blossom topping makes favourable conditions for the parasite. Mineral fertilization is favourable as well as N. Powdery mildew is more severe on the Turkish tobacco vars.; it inhibits TMV but does not eliminate it completely.

GARBER (E. D.). **Further observations on biochemical mutants of Pseudomonas tabaci.**—*Bot. Gaz.*, **120**, 3, pp. 157–161, 1 graph, 1959.

In further studies at the Dept of Botany, University of Chicago, of 7 independently isolated methionine-requiring mutants of *P. tabaci* [**37**, p. 314] the exotoxin produced was found to behave as a methionine antimetabolite, an observation which may be related to the biosynthesis of methionine in this sp. The pattern of virulence and avirulence for susceptible *Nicotiana* spp. and tobacco vars. displayed by the mutants reflected the availability or unavailability of the required nutrilites at the site of inoculation. The avirulence of certain mutants requiring tryptophane may be due to a hitherto unreported mechanism, the host being able to provide an adequate conc. of the required nutrilite, but not other compounds which may be needed to facilitate its uptake. No biochemical mutant was virulent on a host sp. or var. resistant to the parental strain.

CALDWELL (J.). **Persistence of Tomato aucuba mosaic virus in dried leaf tissue.**—*Nature, Lond.*, **183**, 4668, p. 1142, 1959.

Extracts from tomato leaves infected by tomato aucuba mosaic [str. of tobacco mosaic] virus, air dried and stored at the Dept of Botany, University of Exeter, since Dec. 1934 [cf. **13**, p. 660], tested on *Nicotiana glutinosa*, showed that the leaves still retained a little virus activity, though greatly reduced.

HENNING (R. G.) & ALEXANDER (L. J.). **Evidence of existence of physiologic races of Alternaria solani.**—*Plant Dis. Reptr*, **43**, 3, pp. 298–308, 4 fig., 1959.

In this more detailed account of work at Ohio Agricultural Experiment Station, Wooster [**32**, p. 404; **37**, p. 600], evidence is given of possibly 7 distinct physiologic races. The strains differed in their ability to produce lesions on punctured and non-punctured leaflets, these being closely correlated for any 1 strain.

ÅKESSON (H.). **Weibulls Immuna F_1-Tomate. Zum Anbauwert dieser Cladosporium-resistenten F_1-Tomate.** [Weibulls Immuna F_1-Tomato. On the cultural qualities of this *Cladosporium*-resistant F_1-Tomato.]—*Agri. hort. genet., Landskrona*, **17**, 1-2, pp. 76–95, 1959. [English summary.]

Immuna grows vigorously and has a high resistance to *C. fulvum* [**34**, p. 266], but

in 1955 several necrotic plants were found at the Versuchsstation, Frederiksberg, [Sweden]. Consequently a new line free from necrosis, Immuna/56, was selected. It has been tested on a large scale in Norway since 1954, both in hot and cold houses, and in resistance trials in Sweden and Norway it was by far the best var., being absolutely free from leaf mould. In Danish trials it was slightly affected, due no doubt to the existence of a race in Denmark absent from Sweden and Norway. It has proved especially suitable for cold houses.

Dvoretskaya (Mme E. I.), Kost (A. N.), & Pŷrina (Mme I. L.). Влияние некоторых производных гидразина на возбудителя бурой пятнистости Томатов (**Cladosporium fulvum Cooke**). [The effect of some hydrazine derivatives on the causal agent of leaf mould of Tomatoes (*C. fulvum*).]—Науч. Докл. высш. Школ. биол. Наук [*Nauch. Dokl. vŷsh. Shkol. biol. Nauk*], *1958*, 2, pp. 115–124, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 9, p. 212, 1959.]

At the Section on Plant Physiology and Organic Chemistry, Moscow University, U.S.S.R., 5 different compounds all with hydrazine groups were synthesized and tested against tomato leaf mould (*C. fulvum*) [**38**, p. 292]. A considerable fungicidal effect was shown by 4,5 dibromo-1-phenylpyridazinone-6 and acetylhydrazone acetone.

Kern (H.). **Der Einfluß des Lycomarasmins auf den Wasserhaushalt von unterschiedlich mit Eisen ernährten Tomatenpflanzen.** [The influence of lycomarasmin on the water economy of Tomato plants given different levels of iron.]—*Phytopath. Z.*, **35**, 3, pp. 232–237, 4 graphs, 1959. [English summary.]

Studies at the Institut für spezielle Botanik, Zürich, showed that in cuttings with normal or excessive Fe supply lycomarasmin [**38**, p. 37] causes, through its water soluble, transportable iron chelates, an accumulation of Fe in certain leaf areas and consequently toxicity associated with a heavy water loss. In Fe deficient plants the quantity available is too small to produce such an effect; it appears only when additional, complex-bound iron is supplied to the cuttings.

Galli (F.). **Unusual occurrence of two Tomato diseases in the State of São Paulo, Brazil during 1958.**—*Plant Dis. Reptr*, **43**, 1, p. 66, 1959.

Corynebacterium michiganense [map 26], observed in 1956 in Caucaia and Piracicaba, spread rapidly during 1957 and was by 1958 found in nearly all the tomato growing areas of the State, causing 40% loss. *Oidium* was also found in 2 untreated fields. In 1 of them, a single application of karathane eradicated the fungus.

Galach'yan (R. M.). О действии фитонцидов некоторых растений на возбудителей бактериальных болезней Томатов. [On the effect of phytoncides of some plants on the causal agents of bacterial diseases in Tomatoes.]—Микробиол. Сб. А. Н. Арм. ССР [*Microbiol. Sborn. Acad. Nauk Armen. S.S.R.*], *1958*, 9, pp. 123–137, 1958. [Armenian summary. Abs in *Referat. Zh. Biol.*, *1959*, 7, p. 205, 1959.]

Of the phytoncides tested against bacterial canker [*Corynebacterium michiganense*: **38**, p. 574] and other diseases the most effective were those from garlic, onion, and mint. Treatment of tomato seeds with garlic and onion phytoncides considerably decreased bacterial canker in the field.

Kimmey (J. W.). **The heart rots of Redwood.**
Verrall (A. F.). **Fusiform rust of Southern Pines.**
Hepting (G. H.). **Southern cone rust.**
Boyce (J. S.). **Needle cast of Southern Pines.**
Fowler (M. E.). **Oak wilt.**
Wagener (W. W.) & Bega (R. V.). **Heart rots of Incense-Cedar.**—*For. Pest Leafl.*

25–30, 7 pp., 5 fig.; 4 pp., 5 fig.; 4 pp. 1 fig.; 4 pp., 2 fig.; 7 pp., 3 fig., 1 map; 7 pp., 3 fig., 1958.

Leafl. 25 from the California Forest and Range Experiment Station comprises brief descriptions of the heart rots of redwood (*Sequoia sempervirens*) caused by *Poria sequoia* and *P. albipellucida* [cf. **35**, p. 407].

Leafl. 26 from the Southern Forest Experiment Station briefly describes pine fusiform rust (*Cronartium fusiforme*) [cf. **38**, p. 39 *et passim*], one of the most serious diseases of the southern pine forests, with recommendations for control.

In Leafl. 27 from the same Station southern cone rust (*C. strobilinum*) of the slash pine (*Pinus elliottii*), which has recently assumed major importance because of the shortage of seed supplies, is treated in like manner. It can be completely prevented on individual cones by bagging the immature female flowers before artificial inoculation [**36**, p. 625] but no measures have yet been devised for field control.

Leafl. 28 similarly covers the needle cast diseases caused by *Hypoderma lethale* [**38**, p. 39] and *H. hedgcockii* [**30**, p. 131] on the southern hard pines, *Lophodermium pinastri* [cf. **38**, p. 282] on all southern pines, *Bifusella linearis* only on the eastern white pine [*Pinus strobus*], and *Scirrhia acicola* [**38**, p. 39], though not, strictly speaking, a needle cast fungus, on longleaf [*P. palustris*] and loblolly [*P. taeda*] pines. Practical control measures have not yet been devised for forest stands, and are usually unnecessary.

Leafl. 29 from the Northeastern Forest Experiment Station covers distribution, hosts, symptoms, spread, damage, and control of oak wilt (*Ceratocystis fagacearum*) [cf. **35**, p. 402 *et passim*].

Leafl. 30 from the California Forest and Range Experiment Station covers pocket dry rot of *Libocedrus decurrens* (*Polyporus amarus*) [cf. **10**, p. 571], with brief mention also of red ring spot, sometimes called 'white speck', caused by *Fomes pini*, and a brown butt rot, believed attributable to *Polyporus schweinitzii*; the last 2 are occasional diseases of the heartwood and cause very little loss of usable wood.

Koleva-Shekutkovskaya (Milosija). За здравната состојба на шумскиот комплекс Караорман. [On the health of the Karaorman forest complex.]—*Sumarsk. Pregl.*, **5**, 1–2, pp. 42–54, 1957. [English summary. Abs. in *Referat. Zh. Biol., 1958*, 23, pp. 193–194, 1958.]

A note on the forests of Karaorman-Slavey, Ohrid region, Macedonia, with emphasis on the destructive effect of *Microsphaera alphitoides* on oak [**38**, p. 341], *Fomes igniarius* on poplar, *Rhytisma acerinum* on maple, and *F. fomentarius* on beech timber.

Bakshi (B. K.), Arora (K. K.), & Singh (S.). **Root diseases of Shisham (Dalbergia sissoo Roxb.). VII. Physiological studies on the wilt organism, Fusarium solani.**—*Indian For.*, **85**, 5, pp. 310–313, 1959.

In further studies at the Forest Research Institute, Dehra Dun, it was found that *F. solani* [cf. **37**, p. 117] grows over a wide pH range, opt. growth occurring between 4·45 and 5. Below the opt. *F. solani* tends to raise the pH of the medium; over the opt. it lowers it. The pH value of healthy and wilted shisham roots is between 4·6 and 5·2. Soil pH does not affect that of the roots. The fungus is able to attack and colonize shisham roots with a normal moisture content.

Gillespie (W. H.) & True (R. P.). **Three factors which influence the local spread of Oak wilt in five north eastern counties of West Virginia.**—*Plant Dis. Reptr*, **43**, 5, pp. 588–593, 1959.

Further observations by the W. Virginia Dept Agric. [cf. **35**, p. 496] have shown that spread of *Ceratocystis fagacearum* [**38**, p. 489] in this area is correlated with

shallow soils, the availability of 'compatible' oaks, (the same sp. as, or closely related to, the diseased trees at the infection centre, between which root grafting is most likely to occur), and the degree of infection at a centre when first found and treated.

Ponomarenko (A. I.). Причина образования кольцевой гнили в дубовых насаждениях Подмосковья. [The reason for the development of ring rot in Oak stands in the Moscow region.]—Лесн. Хоз. [*Lesn. Khoz.*], **11**, 9, pp. 36–38, 1 fig., 1958.

Observations at the Chekhov forestry nursery, Moscow region, and the Forest-Technical Institute, Podol'skiĭ forestry nursery, showed that this rot occurs only in oak trees of 20 yr. and over. In cross-section the width of the ring is 1–3 cm. or more, being situated 2–3 cm. from the xylem layer of the preceding yr., and formed at a height of 0·4–0·8 m. above the root collar. In the crown the rot penetrates to the centre as heart rot. The rot was calculated to have started 18 yr. previously when the oaks were severely affected by temps. down to −53°. The source of infection appears to be branches attacked by fungi such as *Clithris* [*Colpoma*] *quercina* [**36**, p. 671], *Stereum hirsutum* [**37**, p. 602], *Diaporthe quercus*, etc., infection occurring when they were in close contact with damaged sap-wood. The mycelium spreads quickly, encountering no resistance, and frequently affecting the heart-wood. In established stands timber yield was reduced 24·7% by rot.

Jacquiot (C.). **La Fistuline hépatique, responsable de la coloration du Chêne dite 'queue de vache'.** [*Fistulina hepatica*, responsible for the Oak coloration called 'cow's tail'.]—*Rev. Bois*, **13**, 7–8, pp. 19–20, 2 fig., 1958.

'Brown oak', esteemed by cabinet-makers in Great Britain for its decorative appearance [**17**, p. 277], is regarded as a cause of depreciation in France. In this connexion the life-history of *F. hepatica* [cf. **30**, p. 85; **33**, p. 261] is outlined and measures for the protection of standing and felled trees indicated. Wounds on standing trees should be treated with an antiseptic, e.g. carbonyl. After felling the trees should be sawn up and the logs dried as soon as possible. The application of a combined anti-crack and fungicidal product is recommended where immediate decortication is impracticable. This treatment should prevent the extension of the mycelium provided it has not penetrated the bark beyond 1–2 cm.

Gulyaev (V. V.). Грибные болезни Желудей в Среднем Поволожье и меры борьбы с ними. [Fungal diseases of Acorns in the Middle Povolozh'e and measures for their control.]—Сб. Лес. х-ву Татар. н.-тех. о-во лес. Пром. [*Sborn. Les.-khoz. Tatar. nauch.-tech. O-vo les. Prom.*], *1956*, 12, pp. 159–208, 1956. [Abs. in *Referat. Zh. Biol.*, *1958*, 23, p. 194, 1958.]

In this region of U.S.S.R. imperfect fungi cause the most extensive damage to acorns, followed by ascomycetes, basidiomycetes, and lichens. The ways of infection and overwintering of the pathogens are examined. The best control method was dusting with 1·5 g./kg. granosan. Recommendations for preventing diseases during harvest, transport, and storage are given.

Uroševič (B.). **Mumifikace semen našich listnáču.** [Mummification of the seeds of our trees.]—*Lesn. práce*, **37**, 7, pp. 320–324, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 8, p. 216, 1959.]

In Czechoslovakia mummification of seeds of birch (by *Sclerotinia betulae*), alder (*S. alni*), and oak (*S. pseudotuberosa*) [**37**, p. 423; **38**, p. 341] is widespread. Early harvest of acorns, preservation from frost, and adequate storage at 45% seed humidity and −2 to +3° [C.] are recommended.

May (C.) & Palmer (J. G.). **Effect of selected fungicide-asphalt mixtures on the growth of Ceratocystis fimbriata f. platani in vitro.**—*Plant Dis. Reptr*, **43**, 5, pp. 565–566, 1 fig., 1959.

C. f. f. *platani* [**32**, p. 43] can be spread from one London plane tree [*Platanus acerifolia*] to another in non-antiseptic asphalt tree wound paint. Studies by the U.S. Dept Agric. showed that incorporation in the paint of 0·5% dichlone (which stiffened the varnish), ferbam, phaltan, or thiram, or 0·25% phenyl mercury nitrate prevented growth of the fungus *in vitro*.

Orłoś (H.). **Zagrożenie mateczników topolowych przez grzyby pasożytnicze.** [Infection of Poplar nurseries by parasitic fungi.]—*Las polski*, **32**, 13–14, pp. 6–7, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 8, p. 216, 1959.]

Poplar seedlings and young trees in nurseries in Poland are attacked by *Valsa sordida* [**37**, p. 187] and *Dothichiza populea* [loc. cit.]. Morphological and diagnostic descriptions of the fungi are given and ways of overwintering. Dividing large nurseries into small ones with adequate margins between them, sanitary control, and spraying with fungicides are recommended.

Bier (J. E.). **The relation of bark moisture to the development of canker diseases caused by native, facultative parasites. I. Cryptodiaporthe canker on Willow.** —*Canad. J. Bot.*, **37**, 2, pp. 229–238, 3 pl. (16 fig.), 4 graphs, 1959.

In further work at the University of British Columbia, Vancouver, on the development of bark canker of willow (*Salix hookeriana* and *S. scouleriana*), caused by *C. salicina* [cf. **37**, p. 119], bark on 1- to 2-yr.-old plants was inoculated by scorching an area with a hot scalpel and covering this with a piece of agar+the mycelium. Canker development was inhibited by a relative turgidity of 80% or more, i.e. ratio of the wt. of water in the bark sample to the amount necessary to saturate the sample, but proceeded normally at lower percentages. The results were confirmed by observations in the Vancouver area where during the dormant season, 1957–8, the av. monthly temp. was above the min. for fungal growth on potato dextrose agar, the relative bark turgidity was below 80%, and cankers developed throughout the season. During the growing season temp. was still favourable, but relative turgidity exceeded 80% and canker extension stopped. In winter it was prevented by placing dormant twigs in water which raised the moisture content of the bark above 80%.

Basham (J. T.). **Studies in forest pathology. XX. Investigations of the pathological deterioration in killed Balsam Fir.**—*Canad. J. Bot.*, **37**, 2, pp. 291–326, 3 pl. (14 fig.), 1 fig., 4 graphs, 1959. [38 ref.]

In further studies from the Southern Research Station, Maple, Ontario [cf. **37**, p. 687], of the significance, interrelationships, and succession of the fungi associated with deterioration of balsam fir (*Abies balsamea*) killed by spruce budworm [*Archips fumiferana*], a yeast and *Ophiostoma bicolor* [**34**, p. 828] were the only fungi consistently isolated from discoloured cambium of dying or recently killed trees; *Stereum chailletii* and an unidentified hyphomycete, fungus F, were mainly isolated from the stained sapwood of trees dead less than 1 year. *Polyporus* [*Polystictus*] *abietinus* was the only fungus consistently associated with the rotted sapwood of trees more than 1 year dead. Gradual deterioration of dead trees was accompanied by a regular lowering of the moisture content, pH, and strength of the wood. No marked inhibition or antagonism between the 5 fungi was observed in pure culture; opt. growth of *P. abietinus* in liquid media was at pH 4·5, compared with 6·5 for fungus F and *S. chailletii*, but balsam fir sticks of about pH 6 were readily infected by *P. abietinus* in the laboratory. Inoculation of balsam fir sticks with *S. chailletii* or *P. abietinus* produced a pronounced reddish stain, a significant reduction in

toughness, and lowering of pH of the extracts, while infection with fungus F produced no marked changes. No mutual inhibition was observed between fungus F and *S. chailletii* in balsam fir sapwood and neither of these influenced the deteriorating capacity of *P. abietinus*. It is suggested that the succession of fungi is correlated with the changes in the properties of the wood, particularly the moisture content of the sapwood.

Tartenova (Mme M.). Заболевание Пихты сибирской, вызванное грибом **Laestadia abietella-sibirica S. Schwarzman et M. Tartenova.** [Disease of Siberian Fir, caused by the fungus *L. abietella-sibirica*.]—Труд. Инст. Бот. Казах. Акад. Наук [*Trud. Inst. Bot. Kazakh. Acad. Sci.*], **6**, pp. 195–242, 14 fig., 1959. [72 ref.]

Investigations in 1952–55 in the forests of Zhuravlevka, Strezhanska, and Riderska districts in the Lenino region, Kazakh. S.S.R., and experiments at the laboratory of the Lower Plant Section of the Kazakh Academy of Science, showed that the widespread and damaging disease on *Abies sibirica* is caused by *L. abietella-sibirica* [cf. **31**, p. 88] and its imperfect state *Phoma abietella-sibirica*. The intensity of the spread is correlated with the effects of fumes in the neighbourhood of factory towns and with rainfall. The incubation period of the fungus is 15–26 days, and 48–55 days elapse from infection to yellowing of the leaves. The death of branches and often of whole trees occurs in 14–17 months after infection.

Infected trees show retarded growth, a decrease in the number of cells in the epidermis and mesophyll, increase of the stomata, and a gradual decrease of the carbohydrates and increase of N substances in the needles. Morphological and biological studies of the fungus are described.

Laboratory tests indicated $CuSO_4$, the same at 5%+10% thiram, and 15% thiram at 0·5–1% to be effective against the disease. For prevention in the nurseries spraying with 1% Bordeaux, beginning in early spring and several times later in the summer, proved satisfactory.

Vorontsov (A. I.) & Sergeeva (Mme V. G.). Роль смоляного рака в усыхании Сосновых насаждений [The role of resin canker in the withering of Pine forests.]—Науч. Докл. высш. Школ. Лесоинж. Дело [*Nauch. Dokl. vŷsh. Shkol. Lesoinzh. Delo*], *1958*, 2, pp. 14–17, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 6, p. 206, 1959.]

In Moscow region, U.S.S.R., the main cause of withering in pine is a resin canker associated with complex infection by *Peridermium pini* and *Cronartium flaccidum*, which prepares favorable conditions for insect invasion. Incidence is highest in trees 30–50-yr.-old in pure pine stands.

Treschow (C.). **Forsøg med rødgranracers resistens overfor angreb af Fomes annosus (Fr.) Cke.** [Determining the resistance of races of Norway Spruce to attack by *F. annosus*.] **Forsøg overjordbehandlingens indflydelse på rødgranbevoksningers resistens overfor angreb af Fomes annosus.** [The effect of soil cultivation on the resistance of Norway Spruce stands to *F. annosus*.]—*Forstl. Forsøgsv. Danm.*, **25**, 1, pp. 1–23; pp. 25–34, 1958. [*Biol. Abstr.*, **33**, 6, p. 1907, 1959.]

Tests were begun in 1917–18 with spruce selections from Norway, Finland, Russia, and Germany, and from Danish seed. In 1937 inoculations were made in 3 areas of Zealand, Denmark [cf. **18**, p. 772; **34**, p. 826; **35**, p. 732], all the selections being inoculated in at least 2 plots. The inoculum consisted of cardboard strips (0·4 × 0·4 cm.) soaked in a 3% malt extract solution and permeated with a culture of *F. annosus*, which were inserted 1·2 m. above the ground in a bore hole made to the pith and sealed with grafting wax. Some of the trees in the Valby Hegn wood were

felled in Mar. 1938 and the rest in June 1940. Inoculated but unaffected trees ranged from 0–4/plot. In 2 experimental areas in the Gribskov forest, assessed in 1940, only 2 of all the inoculated trees were unaffected. Once the fungus has reached the heartwood there would appear to be little chance that the inherent properties of the tree will protect it against further advance.

In 1937 two neighbouring stands of Norway spruce, planted in 1878 in Guldborgland Plantation, and 2 in Liebe Plantation planted in 1895–97, were inoculated with *F. annosus*. In each plantation 1 stand had been grown on trench-ploughed soil, in which heavy attacks of the fungus are frequent. With the inoculation method used, no difference in the resistance to *F. annosus* could be observed in the stands.

Yde-Andersen (A.). **Kaerneråd i Rødgran forårsaget af honningsvampen (Armillaria mellea (Vahl) Quél.).** [Heart rot in Norway Spruce caused by the honey fungus (*A. mellea*).]—*Forstl. Forsøgsv. Danm.*, **25**, pp. 81–91, 6 col. fig., 1 diag., 1958. [English summary.]

The following information was derived from the macroscopic and microscopic examination during the summer of 1957 of increment cores from some 100 Norway spruce trees in 27 stands in old woodland areas of Denmark. In most of the stands under 40 yr. old infection by *Fomes annosus* [cf. above] was prevalent in isolates from samples graded 3 (rot extending over less than $\frac{1}{3}$ of the stump diam.) and 4 (more than $\frac{1}{3}$), whereas those in groups 1 (faint discolouration, no decay) and 2 (extensive discolouration, no rot) bacteria predominated in the malt agar cultures, occasionally accompanied by rhizomorphs of *A. mellea*. In stands over 40-yr.-old bacteria and *A. mellea* occurred in some samples of all grades, while many cores also yielded *F. annosus*.

Next to the newly formed annual rings in 20–40-yr.-old stumps attacked by *A. mellea* is an irregularly shaped, damp blotch, pale yellow near the periphery and dirty yellow towards the centre. It may be speckled with caramel-brown spots, while short, dark fissures frequently emanate from the medulla. At a more advanced stage the yellow zone encircles a rotted area of varying extent and gradually turns dark grey to bluish. The outermost fresh annual rings are free from micro-organisms while the yellow zones consistently yield bacteria. Only 1 or 2 main roots are usually found, the others being represented by dark-coloured areas in the cortex consisting of partly destroyed resin, with the remains of a dead root in the centre where the decay presumably originated. Rhizomorphs abound on the exterior of the root bark and under the dead roots is plenty of white mycelium.

A well-defined, pocket-shaped rot occurs in the interior, where the wood is extensively rotted, fibrous, and tawny, gradually turning matt brown. From the central very damp portion *Torula ligniperda* and bacteria were isolated. The severely decayed wood is surrounded by a black zone line, which in turn is encircled by a less affected area a few mm. to $1\frac{1}{2}$ cm. in width, consistently yielding *A. mellea* and bacteria. The latter were also exclusively isolated from an adjoining yellowish, conical region extending upwards into the trunk, usually not beyond 50 cm., where it terminated in a thin point following the medulla. Little information is so far available regarding infection by *A. mellea* in older trees.

These studies have demonstrated for the 1st time the importance, hitherto under-estimated, of *A. mellea* in the etiology of spruce rot, which has up till now been attributed solely to *F. annosus* in Denmark [**37**, p. 120].

Arzumanyan (G. A.). О сравнительной стойкости древесины некоторых древесных пород Армении к пленчатому домовому грибу (**Coniophora cerebella Schröt.**). [On the relative resistance of wood from some tree species in Armenia

to the filmy house fungus (*C. puteana*).]—Изв. тех. Наук., Акад. Наук Арм. ССР [*Bull. tech. Sci., Acad. Sci. Armen. S.S.R.*], **10**, 5, pp. 83–88, 1957. [Armenian summary. Abs. in *Referat. Zh. Biol., 1959*, 6, p. 206, 1959.]

At the Armenian Building Materials and Construction Institute the most resistant of several timbers tested against *C. puteana* [**37**, p. 563] were juniper and oak and most susceptible (comparable with spruce and pine) was aspen.

Meyers (S. P.) & Reynolds (E. S.). **A wood incubation method for the study of lignicolous marine fungi.**—*Bull. mar. Sci. Gulf & Caribb.*, **8**, 4, pp. 342–347, 1958. [*Biol. Abstr.*, **33**, 7, p. 2198, 1959.]

Test panels of wood after being submerged in marine localities often show little or no development of lignicolous fungi during initial laboratory examination. By controlled incubation in sterilized glass chambers the incipient fungal infection develops the characteristic morphological features of the various marine ascomycetes and deuteromycetes present. Determination of the time of attack is thus facilitated, fructifications developing vigorously during incubation.

Carr (D. R.). **Boron as a timber preservative.**—*Wood, Lond.*, **23**, 9, pp. 380–382, 2 fig.; 10, pp. 426–427, 1 fig.; 11, pp. 467–469, 3 fig., 1958. [39 ref.]

It appears from the results of laboratory and field studies in New Zealand that borates are toxic to the principal [unspecified] wood-destroying fungi [**30**, p. 595] provided complete impregnation of the timber by diffusion (rather than pressure) is obtained and subsequent leaching prevented. Where the latter is not an important factor, e.g. in houses, schools, and factories, borates are considered to be as permanent as $ZnCl_2$ or NaF solutions. Treating solutions for the most popular momentary immersion method are prepared by dissolving 1 part of H_3BO_3 with 1·54 parts of decahydrate or 1·18 pentahydrate borax, and impregnation is effected at a temp. of 40–60° C. In addition to tanks, spray tunnel units capable of treating 8,000–15,000 bd. ft. timber daily are in commercial use. The borates have also been found effective against sap stain.

This useful survey comprises both theoretical and practical information on the principles and application of timber preservation.

Gersonde (M.). **Beeinträchtigung eines Randschutzes von Bauholz durch Regen.** [Effect of rain on the surface treatment of timber.]—*Holz a. Roh- u. Werkst.*, **17**, 1, pp. 10–18, 1 fig., 3 graphs, 1959.

At the Bundesanstalt für Materialprüfung, Berlin-Dahlem [cf. **38**, p. 284] extensive tests were carried out with commercial boards of pine and spruce, treated by brushing with 7 wood preservatives. They were exposed to artificial rain equivalent to normal light rainfall. Rain affects mainly the superficial layer, the preservative being washed out after only 5 min. of continuous light rain, where run-off is possible; 20 min. rain/day for 5 days did not cause any significant diffusion of fluorides from the deeper layers towards the surface nor were they washed out. In dry timber, with 20 min. rain/day, beginning 2 days after treatment, losses were as follows: Mg or Zn silicofluoride 50–70%, K or ammonium bifluoride 20–40%, and U-salts 20–30%. After longer storage between treatment and rain, under conditions favourable for diffusion, only ½ the amount was washed out. With the U-salts, in addition to deep penetration, the formation of sparingly soluble fluorine-chrome complexes reduces losses. Taking into account F losses by evaporation, an av. of 22% silicofluoride, 30% bifluoride, and 40% U-salts, based on the quantity of preservative applied, remained in dry wood. With 4 weeks' storage before rain and favourable diffusion conditions, some of the quantities retained were much higher, approx. 45, 38, and 50% of the fluorides applied.

Brewer (D.). **Studies on slime accumulations in pulp and paper mills. II. Physiological studies of Phialophora fastigiata and P. richardsiae.**—*Canad. J. Bot.*, **37**, 3, pp. 339–343, 1959.

It is reported in further studies [**38**, p. 460] that 6 isolates of *P. fastigiata* from pulp mills grew at 3 to 30–35° C. (opt. 20–25°) and pH 4–9; temps. for *P. richardsiae* were somewhat higher. *P. fastigiata* did not require any vitamins in a basal glucose mineral medium with ammonium tartrate, and it was able to metabolize 11 carbohydrates as monosaccharides and oligosaccharides, but not D-arabinose; 16 sources of N as ammonia, nitrate, and various amino acids, except cysteine, were utilized unequally. Differences between isolates of *P. fastigiata* from the same slime were as great as between isolates from different mills.

Browning (B. H.), Russell (P.), Kingsnorth (S. W.), & Peerless (R. J.). **Inactivation of organo-mercurial fungicides in groundwood pulp made from logs stored in salt water, and the possible role of sulphur compounds.**—*Nature, Lond.*, **183**, 4671, pp. 1346–1347, 1959.

A close correlation had been observed at the Bowater Research and Development Co., Ltd., Northfleet, Kent, between the efficiency of organo-mercurial fungicides in preserving moist groundwood and the conc. of certain S compounds in the logs from which the groundwood is produced. These compounds arise from the reduction of inorganic sulphates absorbed from salt or brackish water by halophilic strains of *Desulphovibrio desulphuricans*, isolated from logs stored under natural conditions in sea water for 1 yr. In every case high S content was found in pulp and sapwood samples (stored in sea or brackish water) containing biologically inactive fungicide, while pulps with high residual active fungicide (produced from logs stored in fresh water for 1–2 yr.) contained considerably less sulphidic and reducible S and were free from fungal infection. Mercurial fungicides were deactivated at once on addition to pulp produced from logs after 3 months' storage in sea water, and the deactivating property progressed further into the heart of the log with increasing length of immersion. Sea water alone had no adverse effect on phenyl mercuric acetate or P.M.A.-oxine. Thus apparently absorption by logs of inorganic sulphates is followed by reduction to certain S compounds resulting in biologically inactive Hg compounds when the fungicide is added to the pulp [cf. **37**, p. 427]. The possible formation of thiolignin is being investigated.

Zimina (T. A.). Овощеводство на Сахалине. [Vegetable growing in Sakhalin.]—242 pp., 3 pl., 45 fig., 2 graphs, 1 map, Academy of Sciences of the U.S.S.R., Moscow, 1957. Roubles 10.35. [4½ pp. ref.]

In this monograph an attempt is made to present an overall picture of experiments in raising vegetable crops in Sakhalin, based on the results of researches and experiments by a number of experts. In chapter 8 (pp. 224–234) 'Diseases and pests of vegetable crops and their control', based largely on the work of G. V. Gusev and N. A. Nikiforova, a number of the main fungal and virus diseases of local crops are described with control measures briefly indicated.

Simons (J. N.). **Virus diseases affecting vegetables in South Florida.**—*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 31–34, 1959.

Reviewing the results of studies during the past 5 yr., the author states that the virus causing pseudo-curly top of tomatoes [**38**, p. 37] appears (locally) restricted to this host. A promising line of attack upon virus diseases of vegetables would be to find vars. in which virus build-up is more restricted than in those currently grown. This view is supported by the discovery that the rate of spread within the field is closely correlated with the amount of virus present in the crop [cf. **37**, p. 692].

Conroy (R. J.). **Black ringspot disease of Crucifers.**—*J. Aust. Inst. agric. Sci.*, **25**, 1, pp. 64–67, 4 fig., 1959.

In June 1957 broccoli, cabbage, and cauliflower plants growing in the trial grounds of a seed merchant at Dundas, Sydney Metropolitan Area, N.S.W., developed symptoms which were shown by inoculation of a number of other hosts to be those of cabbage black ring spot virus [cf. **17**, p. 151]. The virus may have been present locally but unnoticed for some time as judged by the slight effect produced on Enkhuizen Glory cabbage and Short's cauliflower.

Gwynne (D. C.). **Field soil assessment for club root in North Wales.**—*Ann. appl. Biol.*, **47**, 2, pp. 361–363, 1959.

In a paper read at a meeting of the Association of Applied Biologists in London in Nov. 1958 the author described the adoption of Colhoun's method [**37**, p. 192] to the assessment of infection by *Plasmodiophora brassicae* in N. Wales [**38**, p. 42] in order to determine the advisability of sowing susceptible brassica crops in a particular field. Correction of nutrient deficiencies in soil samples prior to assessment was found desirable, but further investigation is needed before reliable advice can be given to farmers.

Norman (T. N.), Findlay (M. K.), Rosser (W. R.), & Croxall (H. E.). **Trials of calomel and chlorinated-nitrobenzene compounds for the control of club root.**—*Ann. appl. Biol.*, **47**, 2, pp. 364–366, 1959.

In an accompanying paper to the one above the authors reported that in a glasshouse test in 1956 against club root [*Plasmodiophora brassicae*: cf. **38**, p. 553] of swedes (Finney's Express), seed coated with pure calomel at 100 and 50% by wt. of seed (previously shaken with 26·6% resin in methylated spirits as a sticker, 1 ml./oz. seed) was sown in half biscuit-tins containing 2 kg. of soil from a heavily contaminated site; in addition, boxes were sown with untreated seed with the following soil treatments (applied 3 days before sowing): $HgCl_2$ 1:2,000 at 500 ml./box; aldrex 1:15,000, at the same rate; and aldrin 1% dust incorporated in the top 2 in. of soil at 5·5 g./box. After 2 months it was found that both calomel seed treatments gave as good control as $HgCl_2$. The mean percentage infection was: untreated, 53·8; $HgCl_2$, 2·9; aldrex, 41·6; aldrin, 28·9; 100% calomel, 2; and 50% calomel, 0·7.

In 1957 in a small field trial in a contaminated field, no treatment, calomel 100% and 50%, and a preparation containing 20% PCNB at 50% and 35% gave, respectively, 56, 89, 97, 65, and 69 healthy plants of 200, the corresponding yields being 18, 33, 36, 25, and 22 lb. With both rates of calomel, though only about half the roots were entirely unaffected, the wt. of edible crop was almost double that from the untreated seed.

In 1958 a further experiment was carried out on the previous site at Wolverhampton [**36**, p. 742]. The treatments were 0, 5, 10, 50, and 100% by wt. of pure calomel applied to swede seed with a sticker, which gave, respectively, 80, 77, 82, 89, and 90% healthy plants. It would appear that the pure calomel may serve to delay the onset of the disease in root crops, but further trials are necessary for definite recommendations.

Knösel (D.). **Eine neue, blattfleckenerzeugende Bakteriose an Blumenkohl.** [A new leaf-spot-inducing bacteriosis on Cauliflower.]—*Z. PflKrankh.*, **66**, 5, pp. 257–263, 6 fig., 1 graph, 1959. [English summary.]

From the Institut für Pflanzenschutz der landwirtschaftlichen Hochschule, Stuttgart-Hohenheim it is reported that the bacterium isolated from diseased cauliflowers in the Black Forest area showed a striking similarity to *Xanthomonas campestris*. On the highly susceptible Flora blanka the first symptoms are small, transparent water-logged flecks on the laminae; these become increasingly necrotic

and angular, spreading especially on the outer leaves and coalescing. The leaves corrugate, wither, and fall. At this stage the plant may become systemically infected; flowers are no longer formed or are stunted. Seed transmission was shown to be possible by seed inoculation experiments. The development of the disease is dependent on weather; at high temp. the plant may be destroyed though there is some degree of recovery in cooler periods. A temp. of 20° C. for a few hours for several days coupled with high humidity suffices for the development of the bacteria in the leaves. Heavy rain seems to be the main factor for transmission.

Borders (H. I.). **Effect of seed treatment with streptomycin on Golden Acre Cabbage seedlings.**—*Plant Dis. Reptr*, **43**, 5, pp. 549–551, 1959.

In tests by the U.S. Dept Agric., Tifton, Georgia, treatment with 25 p.p.m. streptomycin for 15 or 30 min. resulted in purple or purple-yellow seedlings which died, whereas 15, 10, and 5 p.p.m. caused only slight initial discolouration, after which recovery occurred [cf. **36**, p. 481]. Arasan, delsan, dynactol, terramycin, and aureomycin had no injurious effect.

Bondoux (P.). **Essai de traitement de la maladie des 'racines tordues' du Cresson.** [Treatment trial of the crook root disease of Watercress.]—*C.R. Acad. Agric. Fr.*, **45**, 6, pp. 271–274, 1959.

Zinc sulphate treatment [**38**, p. 286] proved very successful for the control of *Spongospora subterranea* f. sp. *nasturtii* in watercress beds in 2 localities in Seine-et-Oise, France [**37**, p. 429], in autumn 1958. Untreated beds were devastated, the plant surface being reduced to $\frac{1}{10}$th and invaded by algae; those treated at the rate of 1 kg./50 sq. m. had a normal density and few infected roots.

Heim (Panca). **Sur l'évolution nucléaire du Spongospora qui produit les tumeurs de racines du Cresson.** [On the nuclear development of the *S.* which produces the root tumours of Watercress.]—*C.R. Acad. Sci., Paris*, **248**, 22, pp. 1199–3201, 1959.

The plasmodium of *S. subterranea* f. sp. *nasturtii*, the agent of crook neck of watercress [**38**, p. 286], arises in the 1st place through the cytoplasmic fusion of the uninucleate myxamoebae (plasmogamy), followed by the fusion of paired nuclei (karyogamy). No division occurs either in the myxamoebae or in the young plasmodium before that of the diploid nuclei. The cytology of the watercress fungus presents many analogies with that of the related *Plasmodiophora brassicae* [**36**, p. 64].

Wiesner (K.). **Der Einfluss einer Rübenmosaik-, einer Rübenvergilbungs- und einer Mischinfektion beider Virosen auf Entwicklung, Ertrag und technologischen Wert der Zückerrübe.** [The influence of a Beet mosaic, a Beet yellows, and a mixed infection with both viruses on development, yield, and technological value of the Sugar Beet.]—*Zucker*, **12**, 12, pp. 266–274, 1959.

In field trials during 1956–7 at the Institut für Pflanzenzüchtung Kleinwanzleben, Einbeck, Hanover, Germany, the number of positive infections and symptom development were not influenced by simultaneous inoculation with the 2 above-mentioned viruses [**36**, p. 227]. On the other hand, an already existing beet yellows infection reduces the incidence of mosaic in subsequent inoculations.

The expansion of the leaf rosette is scarcely affected by mosaic, but yellows is responsible for a premature and heavy loss of foliage followed by increased regeneration.

The losses of root weight and purified sugar yield caused by yellows in 1956 amounted to 35·4 and 42·4%, respectively, and in 1957 to 42·5 and 54·6%, respectively, while polarization was reduced by 1·4 and 2·1° S. in the 2 yr. The

diminution of sugar yield caused by mosaic ranged from 5·7 to 10% and polarization fell by 0·6°. No effect on root weight could be demonstrated.

In all the experiments combined infection by the 2 viruses merely multiplied the qualitative and quantitative losses caused by either alone.

Janas (Janina), Antkowiak (J.), & Krzętowski (J.). **Kędzierzawka wirusowa na Kujawach i Pomorzu.** [Leaf curl virus in Kujawy and Pomorze.]—*Gaz. cukrown.*, **60**, 2, pp. 60–61, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 6, p. 210, 1959.]

In the Kujawy region, Poland, beet leaf curl virus caused up to 90% loss, incidence gradually decreasing towards the N. and E. Generally, losses of roots were 65% and of tops 56%; sugar content was reduced by 11%. Control of the vector (*Piesma quadrata*) [**38**, pp. 45, 436] with 16 kg. E-605/ha. is recommended.

Canova (A.) & Flamini (B.). **Rapporti fra virosi e cercosporiosi della Barbabietola.** [The relations between virus diseases and cercosporiosis of Beet.]—*Progr. agric., Bologna*, **5**, 3, pp. 319–345, 2 pl. (1 col.), 6 fig., 2 graphs, 1959.

A full account is given of field and laboratory studies at the Università degli Studi, Bologna, on the effect of infection with beet yellows or mosaic virus or both upon the susceptibility of sugar beet to *Cercospora beticola* [cf. **36**, pp. 78, 294]. The results (which are discussed in detail) clearly demonstrated that virus infection increased susceptibility, yellows giving the greatest increase, dual virus infection the next, and mosaic virus infection the least.

Racoviţa (A.). **Cercetări priviud dezinfectarea aerotermică a glomerulelor (semințelor) de Sfeclă de zahăr.** [Studies on the aerothermic disinfection of Sugar Beet glomerules (seeds).]—*Rev. Indust. Aliment.*, *1958*, 10, pp. 13–19, 1958. [Russian, French, English, and German summaries in suppl.]

At the Bucharest Institute for Food Research, hot air treatment (95–105° C. in 1 test) was found to be effective against *Cercospora beticola* [**37**, pp. 515, 566] and, to a lesser extent, against beet mosaic and beet yellows [loc. cit.] viruses but not against *Phoma* [*Pleospora*] *betae*. The treatment did not affect sugar production or germination capacity.

Flamini (B.) & Antoniani (C.). **Ricerche sulla concia dei glomeruli di Barbabietola.** [Researches on the disinfection of Beet glomerules.]—*Progr. agric., Bologna*, **5**, 1, pp. 58–67, 4 fig., 1959.

A detailed account is given of a small-scale and a large-scale field trial on the control of *Phoma betae* [*Pleospora betae*: cf. **34**, p. 424; **35**, p. 138] at Trebbiola di Rivergaro, Piacenza, Italy, in which glomerules of the imported sugar beet var. Dippes Rekord (found to have 36% infection) and of the local var. Mezzano N (2·5% infection) were sterilized with 1% mercuric chloride or left unsterilized, some being further shaken with solplant containing 1% organic mercury compounds and 20% of the gamma isomer, or with Caffaro powder (16% Cu). Both materials were used at the rate of 700 g./l. of seed.

Not much disease developed in the locality concerned during the season, but the results (which are fully tabulated) indicated that the organic mercury+gamma isomer treatment was much more effective than Caffaro powder. It was not, however, found possible to distinguish between the fungicidal effects of the materials tested and their effect upon the growth of the plants. Sterilization of the seed freed it from infection, but its further effects appeared to be conflicting and could not be clearly interpreted.

György (Károlyné). **A Répagyökérfekély magyarországi elterjedésére és a védekezés lehetőségeire vonatkozó kutatások. (Előzetes közlemény.)** [On the

spread of Beet black leg in Hungary and possibilities for control. (Preliminary Note.)]—*Cukoripar*, **10**, 4–6, pp. 62–66, 1957. [Abs. in *Referat. Zh. Biol.*, *1959*, 8, p. 219, 1959.]

At the Institute of Plant Analysis, Hungary, investigations in 1956 on black leg showed that 19 sugar beet and 14 fodder beet vars. were attacked. *Phoma* [*Pleospora*] *betae* was present in 31·9% of the infections, *Pythium debaryanum* and *Aphanomyces laevis* in 23·7%, *Fusarium* sp. in 20·9%, and *Bacterium* sp. in 11·6%. Some vars. were not affected by *Pleospora betae*. The seeds of different vars. were infected to various degrees by *P. betae*, against which wet treatment with 0·4% fuclasin F and dry treatment with 0·4% granosan, 0·4% ceresan, 0·3% nitrosile, and 0·4% orthocide proved the best.

Čamprag (D.). **Ispitivanje osetljivosti raznih vrsta Repa na plamentjacu—Peronospora schachtii.** [Study of the susceptibility of different Beet varieties to downy mildew—*P. schachtii*.]—*Poljopr. Vojvod.*, *1958*, 2, pp. 123–127, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 9, p. 212, 1959.]

During 1 yr. at the Agricultural College, Novi Sad, Yugoslavia, the German beet vars. and Dobrovitz from Czechoslovakia proved the most resistant to *P. schachtii* [map 28], all local vars. and great numbers of the Hungarian ones the most susceptible.

Orłowska (Mme J.). **Mikroflora grzybowa kopców.** [Fungal microflora of clamps.] —*Gaz. cukrown.*, *1957*, 12, pp. 343–346, 7 fig., 1957. [Abs. in *Pol. tech. Abstr.*, *1958*, 2 (30), pp. 123, 125, 1958.]

Examination at the Sugar-beet Dept, Institute of the Sugar Industry, Poland, of sugar beet roots from experimental clamps showed that sprinkling milk of lime on the clamps to neutralize the acid environment was unfavourable for fungal development. Rotting was heaviest in uncovered clamps containing roots affected by frost during storage; the fungi isolated from these were *Mucor hiemalis* [cf. **14**, p. 655], *Botrytis cinerea* [**22**, p. 418], *Verticillium beticola*, and *Gliocladium verticilloides*.

Lüdecke (H.) & Winner (C.). **Untersuchungen über die Wirkung einer überhöhten Konzentration von Düngesalzen im Boden auf Anfangsentwicklung, Krankheitsanfälligkeit, Ertrag und Qualität der Zuckerrübe. Teil I.** [Studies on the effect of an excessive concentration of fertilizer salts in the soil on the initial development, susceptibility to disease, yield, and quality of the Sugar Beet. Part I.]—*Zucker*, **12**, 7, pp. 133–142, 11 graphs, 1959. [English summary. 21 ref.]

The results of laboratory and field experiments at the Institut für Zuckerrübenforschung, Göttingen, Germany, during 1956–58, showed that excess of mineral salts (NaCl, KCl, K, N, NP, NPKCl, and NPK) may inhibit germination without primary damage to the embryo. When the osmotic level of the soil solution is reduced, delayed germination sets in but root development is more or less retarded and some of the seedlings die before the cotyledons reach the soil surface. This form of decay is not caused or expedited by soil pathogens (including *Pythium* spp.) but is attributable mainly to the injurious osmotic effect of the high salt conc., which in fact reduces the incidence of infection. No specific toxicity of certain ions was observed. Once the plants have emerged and begun to assimilate they usually continue to grow, though root growth is still retarded. A secondary adverse effect of the enhanced hygroscopicity resulting on heavy soils is the impairment of germination by soil obstruction and O deficiency. In practice it is recommended that large quantities of mineral fertilizers should be applied to soils of low absorptive capacity 2–3 weeks before sowing and uniformly distributed.

Khristova (Eleonora). Влияние на агротехниката върху опашното кореново гниене по Цвеклото. [The effect of agrotechnical measures on the root tail rot of Beet.]—Науч. Труд. М-во земед. Сер. растениев. [*Nauch. Trud. M-vo zemed., Sofia, Ser. rasteniev.*], **2**, 6, pp. 29–40, 1957. [Russian and English summaries. Abs. in *Referat. Zh. Biol., 1959*, 6, p. 210, 1959.]

From the Institute for Plant Protection, Sofia, Bulgaria, it is recommended that for the control of tail rot [cf. **37**, pp. 54, 566] in table, sugar, and fodder beet, seed should be sown after cereals, with 45·5–50 cm. between the rows and 20 cm. between the plants (for sugar beet). K and P fertilizers should be applied in the autumn before ploughing and in the spring immediately before sowing; ammonium nitrate only before sowing.

Sukapure (R. S.), Bhide (V. P.), & Patel (M. K.). **Fusarium wilt of garden Peas (Pisum sativum L.) in Bombay State.**—*Indian Phytopath.*, **10**, 1, pp. 11–17, 1957.

Pea plants in the North Satara, India, suffer from a serious wilt, with rolling and drooping of the leaves, starting with the oldest, as the first symptom. The whole plant then slowly dies and dries up. Isolations from wilted plants yielded *F. oxysporum* f. *pisi* race 1 [**35**, p. 72], the morphology and cultural characters of which are described. Growth occurs over 8–35° C. (opt. 27°). All American and Dutch wilt resistant pea vars. proved susceptible. As the fungus differs from race 1 of *F. o.* f. *pisi* in its pathogenicity to commercial pea vars. the authors propose to name the Bombay fungus a biotype of the American pathogen.

Heinze (K.). **Übertragungsversuche mit dem Blattrollvirus der Feldbohne.** [Transmission tests with Broad Bean leaf roll virus.]—*Z. PflKranhk.*, **66**, 4, pp. 220–221, 1959. [English summary.]

At the Institut für gärtnerische Virusforschung, Berlin-Dahlem, *Acyrthosiphon onobrychis* [*A. pisum*] acquired [pea] leaf roll virus [**34**, p 272] after 1 hr. feeding on infected broad beans and transmitted the virus after 1 hr. test feeding. Normal latent time was 1½–2 days, with an exceptional min. of 10 hr. The vector's infectivity was found to diminish during the last days of its life. Daily transfer to new test plants produced 10–14 infected plants, but the last plants to which the vector was transferred (7–10 plants in some cases) remained healthy. The aphid retains the virus after moulting.

Adlerz (W. C.). **Factors affecting transmission of Bean yellow mosaic virus.**—*J. econ. Ent.*, **52**, 2, pp. 260–262, 1959. [19 ref.]

Tests at Oregon State College, Corvallis, to determine the effect of different plant spp. as virus sources on the transmission of bean yellow mosaic virus by *Myzus persicae* and *Macrosiphum pisi* [*Acyrthosiphon pisum*: **37**, p. 434] showed significant differences in efficiency, broad bean being consistently superior to alsike clover, Alaska pea, and Dwarf Horticultural bean [*Phaseolus vulgaris*]. These 4 spp. did not differ in their susceptibility to aphid inoculation with the virus. In the 1st 2 varietal reaction tests in Nov. and Dec., Stringless Blue Lake sustained heavier damage from inoculation by both aphids than did Dwarf Horticultural, Black Valentine, Top Crop, or Bountiful, but in the 3rd, made in Aug., the 2 1st-named vars. were equally susceptible and the only difference was in the superiority as a vector of *M. persicae* over *A. pisum*.

Snyder (W. C.), Nash (Shirley M.), & Trujillo (E. E.). **Multiple clonal types of Fusarium solani phaseoli in field soil.**—*Phytopathology*, **49**, 5, pp. 310–312, 2 fig., 1959.

Soil plating studies at the University of California, Berkeley, using a modified

Martin's agar (15 g. peptone, 0·5 g. $MgSO_4.7H_2O$, 1 g. $KHPO_4$, 25 g. agar, 1000 ml. water, and 1/30,000 rose bengal) indicated an av. of 895 units of *F. s.* f. *phaseoli* [cf. **37**, p. 618; **38**, p. 50]/g. in composite samples from a field currently under spinach, following a crop of beans (*Phaseolus vulgaris*). From 175 mg. soil (on a dry weight basis) 21 distinct clones of the pathogen were obtained. Root rot of an individual bean plant may thus be the result of multiple clone infections.

Chang (Y.-O.), McAnelly (C. W.), & Vaughn (J. R.). **A comparison of the amino acid content of Beans produced from healthy and Fusarium root rot infected plants.**—*Plant Dis. Reptr*, **43**, 4, pp. 437–438, 1959.

At Wyoming Agricultural Experiment Station, Laramie, comparative analysis showed that dry beans from healthy bean [*Phaseolus vulgaris*] plants contained 32·25% crude protein compared with 28·31% in those infected by *F. solani* f. *phaseoli* [**38**, p. 50], and as much or more of each of 10 amino acids. Calculated on a 16% N basis the histidine, iso-leucine, leucine, lysine, phenylalanine, threonine, and valine content of beans from infected plants was greater, but the methionine content was less and arginine about the same.

Bhargava (K. S.) & Gupta (S. C.). **Market diseases of fruits and vegetables in Kumaon. I. Cottony leak of Beans.**—*Indian Phytopath.*, **10**, 1, pp. 48–49, 1957.

In 1955 *Pythium debaryanum* caused a serious disease of stored dwarf bean pods [*Phaseolus vulgaris*] in Nainital, India. It spread very quickly at 20–25° C. Careful handling and other sanitary measures are recommended.

Rudorf (W.). **Genetics of Phaseolus aborigineus Burkart.**—Abs. in *Proc. 10th int. Congr. Genet.*, **2**, p. 243, 1958.

P. aborigineus, a line from Tucuman, resistant to the 4 races of *Colletotrichum lindemuthianum* in Germany [cf. **35**, p. 421], is used for breeding at the Max-Planck-Institut für Züchtungsforschung. Considering as susceptible only plants which after infection with the 4 races die like the susceptible parent, and as resistant as those which either show no sign of infection, like the wild bean, or recover completely, the ratios for race groups α, γ, δ are 9 resistant : 7 susceptible, and for β, 3 resistant : 1 susceptible. In crosses with vars. of *P. vulgaris* fertility was complete and segregation normal.

Schuster (M. L.). **Relation of root-knot nematodes and irrigation water to the incidence and dissemination of bacterial wilt of Bean.**—*Plant Dis. Reptr*, **43**, 1, pp. 27–32, 1959.

In greenhouse experiments by the Dept of Plant Pathology, University of Nebraska, Lincoln, it was shown that *Corynebacterium flaccumfaciens* var. *aurantiacum* [**37**, p. 195] can be carried in irrigation water for a distance of 24 ft. However, in 3 comparable field experiments there was no wilt of *Phaseolus vulgaris* following infestation of the water. Tests with nematodes were inconclusive, but under certain conditions it appeared that *Meloidogyne incognita* could provide wounds for entry of the bacterium.

deZeeuw (D. J.) & Ballard (J. C.). **Inheritance in Cowpea of resistance to Tobacco ringspot virus.**—*Phytopathology*, **49**, 6, pp. 332–334, 6 fig., 1959.

Some of the Black cowpea plants in use at Michigan Agricultural Experiment Station, East Lansing, for local-lesion testing of cucumber mosaic virus were found to be resistant to tobacco ring spot virus. Subsequent study of the F_1, F_2, and backcross generations revealed genetic ratios with a nearly perfect fit for inheritance of a single gene dominant for resistance, which seems independent of the

resistance to cucumber mosaic virus [**35**, p. 263]. The appearance of the F_1 resistant reaction was generally distinct, but precise separation from the resistant parent type could not always be made in the F_2. Resistance apparently originated with a single heterozygous individual. The susceptible reaction, expressed by large local lesions, top necrosis, and death, is systemic; resistance takes the form of hypersensitivity rather than immunity, with small chocolate-brown lesions and no systemic invasion.

KLEIN (H. H.). **Factors affecting development and morphology of reproductive structures of the Soybean root and stem rot Phytophthora. Etiology of the Phytophthora disease of Soybeans.**—*Phytopathology*, **49**, 6, pp. 376–379, 13 fig.; pp. 380–383, 1 fig., 1959.

The *P.* sp. isolated at Ohio Agricultural Experiment Station, Wooster [**37**, p. 626], possessed oogonia with paragynous antheridia. High Lima bean content encouraged oospore formation whereas agar did not effect it; low Lima bean reduced oospore diam. The water (tap or distilled) and agar content affected the formation of sporangia, and the age of the culture their size [cf. **33**, p. 170]. Germination of sporangia varied according to the type of medium, source of the fungus, and age of the culture. Intercalary and resting sporangia were observed.

The 2nd paper records the ready isolation of the *P.* sp. by exposing diseased tissue to which a drop of tween 20 had been added to running tap water on a sieve for 20 min.–2 hr., then plating on Difco Lima bean agar (2·3 g./l.); sporangia and zoospores were produced in 24–48 hr. Field soil was assayed for infestation by sowing 25 soybean seeds/crock of soil and determining (as above) the percentage of plants with *P.* sp. after 3 weeks. The pathogen was obtained more frequently from wet soil than from dry. Sporangia were prevalent on the hypocotyls of newly emerged Harosoy seedlings in inoculated soil and infested field soil; flood water from the latter induced the disease when used to wet steamed soil.

The pathogen was isolated from immature seed in pods on diseased stem areas, but only from mature seed after inoculated pods had been buried in soil from Dec.–Feb. Both seed and soil mixed with it may disseminate the disease. Combined inoculum of cultures of *Fusarium roseum* from maize or *Rhizoctonia* [*Corticium*] *solani* from lucerne with the *P.* sp. in steamed soil caused significant reductions in the number of Harosoy seedlings killed compared with *P.* alone. The reason for this is unknown.

SMITH (P. E.) & SCHMITTHENNER (A. F.). **Further investigations of the inheritance of resistance to Phytophthora rot in the Soybean.**—*Agron. J.*, **51**, 6, pp. 321–323, 1959.

At Ohio Agricultural Experiment Station F_2 populations from 2 crosses, each involving vars. resistant and susceptible to *P. sojae* [**38**, p. 555], were grown in heavily infested soil in the field in 1956 and classified into resistant and susceptible groups. From these, F_3 progenies were grown in the greenhouse in porcelain crocks: at the 1st trifoliate leaf stage 10 ml. of inoculum prepared from a 2-week-old potato broth culture of *P. sojae* kept in a mechanical shaker for the last 4 days of incubation and ground for 10 sec. in a Waring Blendor were injected $1\frac{1}{2}$ in. into the soil at 10 points in each crock. The progenies were classified as resistant, segregating and susceptible. F_4 progenies from 4 selected plants of the F_2 from Blackhawk (resistant) × Capital (susceptible) were grown in the greenhouse in 1958 and inoculated by adding a layer (100 ml./crock) of 3-week old soybean meal-vermiculite culture to the surface of steam-sterilized sand loam and covering with 1 in. of the same soil. Seeds were sown in the top 1 in. The progeny was again evaluated for disease reaction. The data support the conclusion that resistance is dominant and conditioned by a single major gene pair, the dominant allele being modified by

other genes which tend to inhibit the full expression of resistance. Other possible explanations are discussed.

Matuo (T.), Sakurai (Y.), & Kurata (H.). **On wilt of Soybean found in Japan and the causal Fusaria.**—*Res. Rep. Fac. Text. Seric. Shinshu Univ.* 8, pp. 6–13, 4 fig., 1958. [Japanese. Abs. from English summary.]

Morphological investigations and inoculation tests showed that *F. oxysporum* f. [*F. bulbigenum* var.] *tracheiphilum* [cf. **29**, p. 453] and *F. moniliforme* [*Gibberella fujikuroi*] caused blight or wilt of soybean, found for the 1st time in various districts of Japan. When inoculated on soybean, *G. fujikuroi* produced an overgrowth of the seedlings besides causing wilt, but in the field it only caused wilt, as did *F. b.* var. *tracheiphilum*.

Tarjot (M.). **Travaux récents sur la cercosporiose de l'Arachide.** [Recent studies on cercosporiosis of Groundnut.]—*Rev. Mycol., Paris*, **24**, 1, pp. 13–17, 1959. [22 ref.]

A review of the literature since 1951 under the headings: geographical distribution; the parasites (*Cercospora personata* [*Mycosphaerella berkeleyi*] and *C.* [*M.*] *arachidicola*) [cf. **34**, p. 345 *et passim*], with special reference to biological races [**33**, p. 463]; the disease, with special reference to the manner of infection [**36**, p. 448]; and control.

Hartley (C.) & Bailey (W. K.). **Stub-leaf of Peanut (Arachis hypogaea).**—*Plant Dis. Reptr*, **43**, 3, pp. 360–362, 4 fig., 1959.

Groundnut field plantings showing a 'stub-leaf' condition [**6**, p. 651], including those from 39 lots of seed from Indonesia, were investigated by the U.S. Dept Agric. 'Stub-leaf', which follows generally after normal root and hypocotyl development, occurs usually with old seed and is distinct from 'pale dwarf' [**6**, p. 651]. The 1st leaves are petiolate (sometimes abnormally) but with no leaflets, or these are characteristically crinkled and often darker green than normal. The condition is most prevalent after germination in wet, cool weather. Quick recovery occurs with the 3rd or 4th leaf. All 3 types of groundnut grown in Indonesia showed 'stub-leaf' (up to 23% of Holle (bunch type), 18% of Broel (Spanish type), and 14% of Tjina (runner)). Leaf crinkle without definite 'stub-leaf' was present in addition on $\frac{1}{2}$ of the Holle and Broel, and $\frac{1}{3}$ of the Tjina, and was also observed in plants from Surinam seed.

In the U.S.A. both 'stub-leaf' and crinkle were noted on Virginia types. In some lots of seeds plumules otherwise normal vary in colour through various shades from light yellowish tan to dark brown. The defects in Java and the U.S.A. appear to be identical and suggest an environmental cause rather than micro-organisms or genetic factors.

Rangaswami (G.) & Rao (V.). **Alternaria blight of Clusterbeans.**—*Indian Phytopath.*, **10**, 1, pp. 18–25, 2 fig., 1957.

The fungus isolated from leaf spot of clusterbeans (*Cyamopsis tetragonoloba*) [*C. psoraloides*] in India, for which the name *A. cyamopsidis* Rangaswami & Rao is proposed, was grown in culture and its pathogenicity proved. The fungus has much longer beaks than *A. brassicae* ($\frac{1}{2}$–$1\frac{1}{2}$ times the length of the spore); its conidia are light greyish olive, $62–146 \times 12–19\,\mu$; it produces purplish grey mycelium on complex organic media, on which *A. solani* produced a characteristic zinc orange pigment, and unlike *A. brassicae* and *A. brassicicola* failed to produce the ivy green coloured mycelium on oat meal and potato dextrose agars. The fungus infected readily some members of Solanaceae and Brassicae; *A. solani* could infect clusterbeans to some extent, but not *A. brassicae* or *A. brassicicola*. *A. solani* was more

infective to eggplant and tomato than *A. cyamopsidis*, and less so to radish, mustard, and clusterbeans.

Murakishi (H. H.). **The efficacy of certain systemic compounds in the control of Asparagus rust.**—*Plant Dis. Reptr*, **43**, 5, pp. 552–555, 1959.

At Michigan State University, East Lansing, trials in 1957 with 7 compounds showed that the best control of *Puccinia asparagi* [**33**, p. 64; **37**, p. 619] was obtained with 2 sprays (14 and 23 Aug.) of either actidione-S [**37**, p. 654] (200 and 100 p.p.m.) or D-113 (1,2 dichloro 1-methyl sulphonyl ethylene, 1250 p.p.m.), mean infection indices on 13 Sept. being 0·48 and 1·44, respectively, compared with 3·71 for the untreated. In further trials in 1958 2 applications of actidione-S proved as effective as 6 of zineb. Actidione-S at 0·1 qt. (100 p.p.m.)/plant was effective and not phytotoxic; at 200 p.p.m. or 0·25 qt. it caused slight but not permanent injury.

Freitag (J. H.), Aldrich (T. M.), & Drake (R. M.). **Aster yellows virus in Celery.**—*Calif. Agric.*, **13**, 4, pp. 5, 14, 2 fig., 1959.

During 1951–53 aster yellows became a serious threat to celery-growing in the Arroyo Grande Valley, California [cf. **34**, p. 765], many growers losing 50% or more of their plantings. In 1955 creek bottom areas, the favoured habitat of the vector *Macrosteles fascifrons*, were sprayed with DDT from the air at approx. fortnightly intervals from 16 Apr., shortly after the first appearance of the aphids, until 21 July. Spraying of these areas was continued in the following years, and losses have been less than 5%.

Attia (M. S.). **Infection studies with late blight of Celery.**—*Ann. agric. Sci., Cairo*, **2**, 2, pp. 183–189, 1957. [Arabic summary.]

At the Vegetable Research Station, Dokki, Egypt, seeds of celery var. Cornell 6 (Danish 19×Cornell 19), and inoculum of dried celery leaves infected by *Septoria apii* were used to evaluate inoculation methods for breeding purposes. The highest infection rates (85 and 50 spots/leaf) 12 days after inoculation were obtained with a high spore conc. (9·8 and 5·4 spores/microscope field) on plants maintained for 50 hr. at 100% R.H. and at 63° F. Wellman's method [cf. **19**, p. 170] gave a more severe and more uniform test than spraying on the inoculum. While the higher conc. of spores gave a larger number of lesions in all vars. tested, the lower showed more clearly the gradation in degree of resistance between the 3 vars. tested (Cornell 19, G.S.B.×Danish, and Danish).

Darby (J. F.). **Fungicides for the control of late blight of Celery.**—*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 56–59, 1959.

In an experiment at the Central Florida Experiment Station, Sanford, 15 applications of nabam + $ZnSO_4$ (2 qt., 0·75 lb./100 gal.), maneb-ferbam mixture (1 lb., 1 lb.), dyrene (2 lb.), ferbam (2 lb.), diammonium ethylene bisdithiocarbamate+calcium hypochlorite (1 qt., 1 lb.), 75% thiram (1·5 lb.), sodium dimethydithiocarbamate+ferrous sulphate (1 qt., 1 lb.), and maneb (1·5 lb.) gave significant control of both *Septoria apii-graveolentis* and *S. apii* on Florida Green Pascal celery. Yield was nearly twice that of the untreated.

Darby (J. F.) & Westgate (P. J.). **Lithium as a fungicide on Celery.**—*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 59–62, 1959.

In a field test at the Central Florida Experiment Station, Sanford, in 1958, dilithium ethylene bisdithiocarbamate (34% at 1 qt./100 gal.), applied 15 times at 150 gal./acre, was almost without phytotoxic effect [cf. **37**, p. 693] on celery and gave excellent control of late blight (*Septoria apii-graveolentis* and *S. apii*) [see above]. The control obtained was statistically equal to that given by nabam (19%)

+$ZnSO_4$ (2 qt., $\frac{3}{4}$ lb./100 gal.), but the yield was only 456·75 lb./0·014 acre, as against 536·75 lb. for nabam+$ZnSO_4$.

Pontis[videla] (R.E.) & Feldman (J. M.). **A new host of Sclerotinia sclerotiorum in Argentina.**—*Plant Dis. Reptr*, **43**, 3, p. 421, 1959.

A report from the Universidad Nacional de Cuyo, Mendoza, of a 1st record of this fungus on celery in the country, with a list of 11 other economic hosts previously recorded there.

Frost (A. A.). **Tube-grown Lettuce at Pershore.**—*Agriculture, Lond.*, **65**, 6, pp. 296–298, 1 pl., 1958.

At the Pershore Institute, it has been found that planting lettuce seedlings in paper tubes, $1\frac{1}{2} \times 2$ in., placed 40 in a box and covered with John Innes No. 2 or, preferably, No. 3 compost which is 'firmed' into them, and then transplanting these tubes to the permanent bed leaving $\frac{1}{2}$ in. above soil level, avoids a check to growth and has resulted in a remarkably low incidence of *Botrytis* [*cinerea*], previously responsible for heavy losses.

Cleary (J. P.). **Bacterial wilt disease of Lettuce.**—*Ann. appl. Biol.*, **47**, 2, pp. 370–372, 1959.

In 1957–8 it was repeatedly noticed that glasshouse lettuces in Yorkshire and Lancashire affected by a basal rot, together with a wilting and collapse of the plant occurring at any stage of development, seldom bore sporulating *Botrytis cinerea*. The symptoms corresponded to those described from Florida recently by Winfree *et al.* [**37**, p. 749]. The vascular system immediately above the rotted area showed a staining which continued into the midrib and the heart. In some cases the plants had wilted without any rotting of the stem, and an earlier stage of the disease could be distinguished, characterized by a change in the leaves from a shiny, light green to a dull, deeper green. Microscopic examination of sections of the stem and midrib showed the presence of Gram— bacteria, $1{\cdot}5–2{\cdot}5 \times 0{\cdot}5\,\mu$, in the vascular tissue.

The disease could not be reproduced in either steam-sterilized or unsterilized soil inoculated with the organism, but 20 of 100 plants developed a typical wilt after stem inoculation with a hypodermic syringe, and the organism was re-isolated. The 5 isolates tested have many of the characteristics of *Pseudomonas marginalis*, with which however they did not fully agree.

In every glasshouse where the disease was present the soil had a high moisture-content. In one nursery where the soil was purposely kept near to the max. field capacity for the whole of the period of growth a loss of 48% was sustained in a crop grown Oct.–Dec. A 2nd crop in the same house, grown Jan.–Mar. with no water after a flooding 1 week before planting, had under 2% loss.

As lettuce forms no abscission layer to cut off the dead first-formed leaves after transplanting, should the environment remain permanently humid infection by pseudomonads through this dead tissue could easily take place, with direct access to the vascular system of the plant, and a stem rot at soil level suggests entry of organisms at this point rather than through the roots. It is considered surprising that *B. cinerea* was not encountered more often, but high humidity may favour invasion by *Pseudomonas* which, once established, suppresses attacks by *B. cinerea* [cf. **31**, p. 270].

Nariani (T. K.) & Sastry (K. S. M.). **Two additional vectors of Chilli mosaic virus.**—*Indian Phytopath.*, **11**, 2, pp. 193–194, 1958.

Investigations during 1956–7 at the Indian Agricultural Research Institute, New Delhi, showed that chilli mosaic virus [**36**, p. 510] was transmitted by *Myzus persicae* and *Aphis euonymi*, the efficiency of the latter being much lower than that of the former.

Chowdhury (S.). **Studies on the development and control of fruit rot of Chillies.**—*Indian Phytopath.*, **10**, 1, pp. 55–62, 1 fig., 2 graphs, 1957.

At the Plant Pathological Laboratory, Jorhat, Assam, the opt. growth temp. in culture of *Colletotrichum capsici*, the cause of ripe fruit rot of chillies in Assam [**36**, p. 445] which destroys 12–32% of the fruit, was 28° C. at 92% R.H. and pH 5–6 [cf. **36**, p. 416]. Below 90% R.H. the disease did not develop. The fungus survives in plant debris, primary infection coming from air-borne spores derived from it. Three to 4 sprays at intervals of 15–21 days designed to afford complete fruit cover increased the percentage of healthy fruits considerably in trials over 3 yr. and maintained their condition better after drying. The 4 fungicides tested were equally effective.

Tomlinson (J. A.), Shepherd (R. J.), & Walker (J. C.). **Purification, properties, and serology of Cucumber mosaic virus.**—*Phytopathology*, **49**, 5, pp. 293–299, 2 fig., 2 graphs, 1959.

Much of this information has been noticed [**38**, p. 249]. The virus was obtained from cucumber corollas, where it attains its max. conc. in this host [**32**, p. 231], or, in larger quantities, from tobacco leaves, in which it reached a max. on the 3rd day after inoculation. Infected tissue was homogenized in strong buffer containing a reducing agent (0·1% thioglycollic acid), the filtrate was clarified with 8·5% butanol, and the virus concentrated and partially purified by differential centrifugation. Acid precipitation, with 10% acetic acid, and further differential centrifugation (the whole process being described in detail) yielded a purified virus solution containing a nucleoprotein with a sedimentation constant of 101S.

Grogan (R. G.), Hall (D. H.), & Kimble (K. A.). **Cucurbit mosaic viruses in California.**—*Phytopathology*, **49**, 6, pp. 366–376, 1959. [27 ref.]

Part of this comprehensive study from the University of California has been noted [**38**, p. 52]. After inoculation of numerous spp. in 7 families with an isolate of watermelon mosaic virus (WMV) from squash the virus was recovered from 8 spp. and others showed mild mottling in varying degree. Further inoculations with 12 other collections from various sources to spp. of Leguminosae (12), Malvaceae (4), and Cucurbitaceae (3) resulted in recovery ranging from 14 of the 17 spp. used for 1 collection to the 3 cucurbits only with another. WMV was also recovered from a few wild plants of lucerne, *Malva parviflora*, and *Melilotus indica* and cucumber mosaic virus from 2 samples of *Solanum elaeagnifolium*. Though some viruses were not recovered from many wild plants showing symptoms such plants probably form an important natural source of primary WMV inoculum.

There was considerable variation in the physical properties of the different collections of WMV. This virus also appeared to be common on the W. coast of Mexico.

Rosberg (D. W.). **The effect of infra red irradiation on the incidence of Tobacco ringspot virus disease symptoms in Watermelon.**—Abs. in *Phytopathology*, **49**, 5, p. 319, 1959.

Irradiation of seed from 'pimpled' watermelon fruits infected by tobacco ringspot virus [cf. **36**, p. 299] over a range of 70–90° C. (5° increments) for 5–30 min. reduced the incidence of pimpling in the next crop of fruit from 37·8% in the controls to <2%. The process retards germination and growth, delaying fruit maturation by 10–14 days. It is uncertain whether irradiation inactivates the virus or merely masks the symptoms.

Hegde (R. K.) & Bhide (V. P.). **Watermelon wilt in Bombay State caused by Fusarium oxysporum f. niveum (E. F. S.) S. & H.**—*Indian Phytopath.*, **11**, 1, pp. 49–52, 1958.

At the Plant Pathological Laboratory, College of Agriculture, Poona, *F. oxysporum*

f. [*F. bulbigenum* var.] *niveum* [**35**, p. 72] from watermelon failed to infect other Cucurbitaceae; the local vars. Poona, Bombay, Kumpta, Yawal, as well as Muskati, Farukabadi, Fairabadi, and Jaunpuri proved susceptible.

Mathur (R. L.) & Mathus (B. L.). **Fruit rot of Citrullus vulgaris var. fistulosus L.** —*Indian Phytopath.*, **11**, 1, pp. 66–69, 1958.

Tinda fruits, grown extensively as a summer vegetable in Rajasthan, Uttar Pradesh, Madhya Pradesh, and Punjab, have suffered considerable damage in the market at Kota (Rajasthan) from rotting caused by *Fusarium oxysporum*, the pathogenicity of which was established, but only to injured fruits. Careful handling to avoid injuries is recommended as an effective control measure.

Winstead (N. N.), Goode (M. J.), & Barha (W. S.). **Resistance in Watermelon to Colletotrichum lagenarium races 1, 2, and 3.**—*Plant Dis. Reptr*, **43**, 5, pp. 570–577, 1959.

Further studies at the N. Carolina State College, Raleigh [**37**, p. 624], with 86 vars. and hybrids of watermelon showed all vars. resistant to race 1 of *C. lagenarium* to be resistant to race 3 and susceptible to race 2. The other vars. were susceptible to all 3 races. An African introduction, W-695, appeared to be segregating for resistance to race 2, the only resistance found to this race. Resistance to races 1 and 3 is controlled by the same dominant gene.

Lister (R. M.). **Mechanical transmission of Cassava brown streak virus.**—*Nature, Lond.*, **183**, 4675, pp. 1588–1589, 2 fig., 1959.

Cassava brown streak virus [cf. **36**, p. 747] has been transmitted mechanically at the Scottish Horticultural Research Institute, Invergowrie, from cassava to several solanaceous plants by macerating mature infected leaves in water with alumina powder and 'celite' and rubbing the extract on the leaves of test plants; extracts from young leaves gave no infections. Infected plants of *Petunia hybrida* were stunted, with crinkled leaves showing vein chlorosis and necrosis. In *Datura stramonium* systemic chlorosis of the fine veins developed in summer, but only necrotic local lesions in winter. Tobacco developed local lesions only, but *Nicotiana rustica* and *N. glutinosa* exhibited mild systemic vein chlorosis. Some infected cassava plants developed sepia-coloured necrosis in the roots. In infective *Petunia* sap the virus was rather unstable with a longevity *in vitro* of less than 24 hr. at 20° C. and the infectivity of sap was drastically reduced after 10 min. at 50° and abolished by diluting 1:1,000 with water.

Nariani (T. K.) & Seth (M. L.). **Reaction of Abelmoschus and Hibiscus species to 'yellow vein' mosaic virus.**—*Indian Phytopath.*, **11**, 2, pp. 137–143, 7 fig., 1958.

Of 8 spp. of *Abelmoschus* and 4 of *Hibiscus* tested at the Indian Agricultural Research Institute, New Delhi, for their reaction to [Hibiscus] yellow vein mosaic virus [**35**, p. 653] by grafting as well as by exposure to viruliferous white flies (*Bemisia tabaci*), *A. manihot* var. *pungens*, *A. crinitus*, *H. vitifolius*, and *H. panduraeformis* were immune. Symptoms are described.

Atkins (F. C.). **This Mushroom business.**—107 pp., 8 pl., London, Faber and Faber Ltd., 1958. 18*s*.

A record of progress in mushroom growing and the mushroom industry since the war in popular terms, reviewing, *inter alia*, various methods of cultivation and composting and the major causes of abnormal cropping. A chapter on serious damage by disease in 1957 deals with the diseases known as *Fusarium* [**29**, p. 196], mummy, and La France [**38**, p. 291], and diseases are referred to in various contexts throughout the book.

Spurr (A. R.). **Sources of information on Mushroom research and production.**—*Univ. Calif. Veg. Crops Ser.* 97, 14 pp., 1959.

This publication lists a wide range of miscellaneous sources from which information and literature, native and foreign, on mushroom cultivation can be obtained.

McCarthy (G. J. P.). **Growing mushrooms in Queensland.**—*Qd agric. J.*, **85**, 4, pp. 227–235, 7 fig., 1959.

Instructions are given on preparing the compost for the beds, different ways of setting up the beds, indoors (in summer in Queensland) or outdoors (in winter), spawning techniques, and casing. The last part, on the care of the beds and harvesting, deals briefly with diseases and pests and recommended control treatments.

Block (S. S.), Tsao (G.), & Han (L.). **Production of Mushrooms from sawdust.** *J. Agric. Fd Chem.*, **6**, 12, pp. 923–927, 1958. [*Biol. Abstr.*, **33**, 6, p. 1855, 1959.]

At the University of Florida, Gainesville, the yields of mushrooms grown on fortified, composted, gum-wood sawdust, were much higher (by wt.) than commercial yields from horse-manure compost. *Pleurotus ostreatus* grew in 2 weeks on sterile sawdust medium fortified with oatmeal; on non-sterile, composted, balsa-wood sawdust it gave a yield of 1·21 lb. fresh wt./lb. of dry sawdust; when the medium was fortified with soybean meal, the yield was 1·41 lb. In all the experiments, the yields/sq. ft. were low.

Schmidt (H.). **Fruchtkörperbildung und Luftfeuchtigkeit in Champignon-Kulturen.** [Fruit body formation and atmospheric humidity in Mushroom beds.]—*Z. Pilzk.*, **24** (*1958*), 3–4, pp. 81–87, 4 fig., 1959.

As a result of experiments in Germany in 1951 the author found that a fall in R.H. from 99–100% to 97–98% in the cellar or shed did not delay but stimulated the growth of existing fruit bodies and the formation of new fruit body primordia. An increase in R.H. from 97–98 to 100% did no harm but decelerated growth. A fall from 97–98 to 96–97% did not kill the existing primordia but caused new ones to develop deeper in the casing layer of sand. A fall from 98 to approx. 93%, even for a relatively short time, caused the primordia which had developed almost on the sand surface to die, thus confirming the importance of a regular and not too high transpiration rate for the formation of fruit bodies [**18**, p. 571].

Ciccarone (A.). **Degenerazione infettiva della Vite, nematodi e fumigazione del suolo.** [Infectious degeneration of the Vine, nematodes, and soil fumigation.] Reprinted from *Ital. agric.*, *1959*, 2, 4 pp., 1 fig., 1959.

In 6 of 8 soil samples from vineyards affected by infectious degeneration [cf. **36**, p. 165] in Abruzzo and Apulia, D. J. Raski found *Xiphinema* sp. present and in 2 of these *X. index* [**38**, p. 237] was identified; *Criconemoides* sp. was found in 2 samples.

Graniti (A.). **Probabile presenza della 'malattia delle enazioni' della Vite in Puglia.** [The probable presence of 'enation disease' of the Vine in Apulia.]—*Notiz. Malatt. Piante, 1959*, 47–48 (N.S. 26–27), pp. 140–143, 2 pl. (6 fig.), 1959. [English summary.]

Towards the end of 1956, vines growing in the province of Foggia, S. Italy, developed a condition marked by the presence of enations on the under surface of the leaves, various leaf malformations, irregular growth and cracking of the stems, and proliferation of the buds. It was confirmed by W. B. Hewitt that the condition resembles 'enation disease' of vine in California [**34**, p. 344].

Bourdier (L.). **Rivoluzione nella tecnica della difesa sanitaria della Vite.** [A revolution in the technique of the sanitary protection of the Vine.]—*Progr. agric., Bologna*, **5**, 6, pp. 689–694, 1 col. pl., 3 fig., 1959.

In 1958 vines at Angers, France, were treated against *Plasmopara viticola* with a pneumatic sprayer ('Fontan', of German manufacture) giving a very powerful air-blast, the type of machinery being known as an 'air micronizer'. From a centrifugal ventilator 600 cu. m. of air/h. emerge in a current at 200–300 km./hr. An air-current travelling at 30 km./hr. at a distance of 1·5 m. from the barrel agitates the vine foliage violently and so allows thorough dispersal of the droplets on both surfaces of the leaves. The spray fluid was viscosan CZ (33% copper oxychloride+13% zineb), mixed ½ hr. before use and filtered before being poured into the tank. For the 1st 2 applications 10% was used and for the 6 subsequent ones (2 June–28 Aug.) 15%; control vines were sprayed on the same dates with cuprosan (0·5% for the 1st 2 applications, then 0·6%) from a Vermorel sprayer.

On 26 Aug. the av. no. of infected leaves/5 vines for treatment with the pneumatic sprayers was 30·25, as against 45·25 for the other. On 13 Nov. the av. wt. of leaves picked from 5 vines was 2·95 kg. for the pneumatic and 2·275 for the Vermorel. At the end of harvest the Vermorel-treated plots were severely infected, whereas infection was virtually absent from those treated with the pneumatic sprayer. On 17 Oct. the av. amount of total Cu/sq. cm. was 4·9 μg. on the upper leaf surface and 1·1 μg. on the lower for the Vermorel treated and 0·3 and 5·8 μg. for the other. Tests in other parts of France in 1958 confirmed the value of this method of spraying against *P. viticola*.

Komarov (M. I.). Применение аэрозолей на виноградниках. [The use of aerosols in vineyards.]—*Sad i Ogorod*, **96**, 6, pp. 67–70, 1 fig., 1958.

Aerosol spraying was carried out in June 1957 at the Viticulture and Wine-making state farm 'Gelendzhik', Krasnodar area, with aerosol apparatus AG-L6 built by the Moscow Plant Protection Station. Vines 5 days after aerosol treatment [cf. **36**, p. 301] with 20% copper naphthenate showed no mildew [*Plasmopara viticola*: **38**, p. 443]. They were again examined after a heavy sea mist, which occurred 2 days later, and 3 nights of dew. Mildew was found on the leaves in the section where spraying had been carried out during strong wind. The character of the infection was peculiar: the fungus developed in small streaks and zigzags, 1–1·5 mm. in width. Conidia were formed 1–2 days later. It was concluded that if 20% copper naphthenate is used as an aerosol against mildew, it must be applied at not less than 60–80 l./ha.; the aerosol apparatus must be capable of an output of not less than 25–30 l./min. The method is considered very promising.

Tsvetanov (D. D.). Антракнозата по Лозата и борбата с нея. [Vine anthracnose and its control.]—Лозарст. Винарст. [*Lozarst. Vinarst.*], **7**, 1, pp. 15–18, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 9, p. 214, 1959.]

At the Scientific Research Institute for Vine and Winemaking, in Pleven, Bulgaria, spray tests on vine against anthracnose [*Elsinoe ampelina*: **37**, p. 570] showed selinon [cf. **36**, p. 481] at 2 and 1% to be best for the dormant period. Other chemicals ($FeSO_4 7H_2O$ at 22–32%+H_2SO_4, and 5° ISO) were inferior. Spraying with fuclasin during the growing period proved much superior to the other 3 compounds used. The most susceptible vars., from observations in 1957, were Bolgar and Beliĭ seedless.

Report of the Rothamsted Experimental Station for 1958.—283 pp., 1 pl., 1 map, 1959.

In the report on the work of the Plant Pathology Dept under P. H. Gregory (pp. 96–111) [cf. **37**, p. 630], B. Kassanis states that by means of infectivity tests new tobacco mosaic virus (TMV) was detected 2 hr. earlier in tobacco and *Nicotiana*

glutinosa plants inoculated with the infectious ribonucleic acid obtained from the virus than in plants inoculated with the whole virus. The shortest period in which newly formed virus could be detected was 6 hr. after inoculation with nucleic acid. Further, when *N. glutinosa* plants inoculated with the 2 kinds of inoculum were dipped in water at 50° C. for 30 sec. the number of local lesions from each kind of inoculum was reduced when the treatment was applied immediately after inoculation, but no effect resulted when it was delayed for 4 hr. in the case of the nucleic acid and for 6 hr. in that of the whole virus. *N. glutinosa* plants inoculated with nucleic acid developed very few lesions when placed at 37° immediately after inoculation, though the usual numbers formed when treatment was delayed for 2 hr. Exposure to this temp. does not affect the number of lesions following inoculation with the whole virus, and 2 hr. may be the min. time for new virus to be synthesized when the inoculum is nucleic acid.

A. Kleczkowski reports that further studies of the decomposition products of TMV yielded evidence that the nucleic acid does not contribute to the surface potential of the virus particle. Alkali-produced, disaggregated protein of TMV is an antigenically heterogeneous mixture lacking an antigenic group present in the original virus particle. Recombination of the proteins with nucleic acid appears to restore the lost antigenic group, though the nucleic acid by itself is not antigenic. The recombined nucleoprotein behaves as an antigenically homogeneous material.

Work by H. L. Nixon on methods for mounting plant viruses for electron microscopy at high resolution is described.

B. D. Harrison obtained evidence that soil-inhabiting organisms play a part in the soil-transmission of some ring spot viruses [cf. **38**, p. 268]. The composition of the soil fauna in virus-containing and virus-free soils differs in many respects. Purified preparations of a str. of tobacco rattle virus [str. of potato stem mottle virus] from Scotland contained long and short, rod-shaped particles separable by high-speed centrifugation; only the longer were infective.

Studies by Marion A. Watson & M. Chessin showed that the loss of yield caused by the beet yellow net virus [cf. **38**, p. 171] in sugar beets 2 months old was smaller than would be likely in plants similarly infected with necrotic beet yellows virus [beet yellows virus str.]. Plants treated with gibberellic acid lost about 30% of the root yield as a result of infection, while the untreated lost about 20%. Plants affected by [beet] yellow net virus, particularly middle-aged leaves displaying the principal yellow net symptoms, had much less sucrose and reducing sugars than normal plants. The yield of sugars/kg. fresh wt. of leaf laminae averaged 3·5 g. for healthy plants, but only 0·4 g. for middle-aged leaves of infected plants and 1·5 g. for other leaves. Yellow net virus contrasts strongly with beet yellows virus [cf. **35**, p. 585], which increases the carbohydrate conc. in infected leaves.

T. Mulligan lists 8 meadow and hedgerow grasses which behaved as symptomless carriers when inoculated experimentally with cereal [barley] yellow dwarf [cf. **37**, p. 631], 3 (in addition to maize and rice) which showed leaf discoloration and stunting, and 2 which appeared to be immune.

In glasshouse and field experiments Marion A. Watson & D. A. Govier compared 2 yellow dwarf viruses of cereals which were found to be distinct, one being virulent, the other not. In field plots infected with the 2 viruses at fortnightly intervals during Apr.–June, the earliest infection caused 80% loss in Blenda oats and 65% in Koga II wheat and Proctor barley. The 2nd and 3rd infections caused losses of 50 and 15%, respectively. With the avirulent virus, the loss from the 1st 2 infections was 40–50% and that from the last was negligible. T. Mulligan reports that rye grass [*Lolium*] mosaic virus [loc. cit.] was transmitted by *Abacarus hystrix* to 10 of 20 S22 Italian rye grass [*L. italicum*] plants, each tested with 10 mites immediately after these had fed 3 days on infected rye grass. The mites lost half their infectivity in about 3 hr. while feeding on Capelle wheat and almost all

of it after 12 hr. Healthy mites fed on infected leaves for 12 hr. transmitted the virus as readily as those fed for 24 or 48 hr., but those fed for only 6 hr. did not transmit it. Freshly extracted sap of infected S22 Italian rye grass plants at pH 7 lost most of its infectivity in 10 min. at 55°. Rice, oats, and 2 other grass spp. developed streaking when infected. The work by MARION A. WATSON & R. C. SINHA on the variation in transmission of wheat striate mosaic by leafhoppers [*Delphacodes pellucida*] has been noticed [**38**, p. 315]. Some transmitted virus to a high proportion of nymphs, and these often passed it on on the day of hatching, though inefficient races transmitted it to very few.

MARION A. WATSON found that viruses transmitted by *Myzus persicae* from mixed infections such as non-aphid-transmissible potato virus C (from Edgecote Purple potatoes) with potato virus Y [loc. cit.] in *Nicotiana glutinosa* often give black, necrotic, local lesions characteristic of potato virus C when inoculated to Majestic potatoes, though potato virus Y alone and isolations from it never gave such lesions. Combined viruses, possibly hybrids, giving local lesions followed by necrotic, systemic infection in Majestic potatoes retained their character in *N. glutinosa*. An aphid-transmitted, persistent virus was isolated from yellow, stunted carrot plants from Cambs., the symptoms resembling those of carrot motley dwarf virus in Australia [cf. **28**, p. 435; **36**, p. 509, *et passim*].

In studies by L. BROADBENT, G. D. HEATHCOTE, & P. E. BURT spraying potato plants with DDT and metasystox on 3 June 1957 reduced the spread of leaf roll virus to less than one quarter of the amount on unsprayed plots, but sprays applied on 10 June, 3, or 30 July had no significant effect. Spread of rugose mosaic virus was not reduced. The recommendations made earlier to farmers to keep their sprayed stocks of seed potatoes for 3–5 yr. were shown to be justified [**38**, p. 158].

Dealing with fungus diseases J. M. HIRST & O. J. STEDMAN record that a plot of 600 healthy Majestic potato tubers was interplanted with Pentland Ace tubers artificially infected with race 3,4 of *Phytophthora infestans* and with all the eyes removed to prevent growth. On 4 July, a week after heavy rain, blight lesions were found on 27 Majestic plants, all the lowest leaves of which were hanging over the furrows, suggesting that in wet conditions outbreaks of blight can be started without invasion of the stems, by the introduction of *P. infestans* into unsterile soil on an appreciable food base. In experiments by D. H. LAPWOOD defoliation of potato plants resulted mainly from the direct infection of the leaflets by *P. infestans*, and not from their indirect destruction through stem or petiole lesions. There was evidence that more spores are produced on some vars. than on others. In Arran Viking in the field the width of the zone producing spores changed as the lesion grew, but in the susceptible Up-to-Date, the average width of the sporing zone remained about the same (3·2–3·9 mm.), irrespective of the size of the lesion. In Arran Viking the sporing zone of lesions 5 mm. diam. was only 1 mm. wide but in large lesions it was almost as wide as in Up-to-Date. Arran Viking produced few spores on the smaller lesions, a feature also noted in the laboratory in the resistant vars. Ackersegen and Ås. Whereas with suitable temp. and humidity the sporing zones of Arran Viking can equal those of a more susceptible var., in a field crop these conditions may be reached only at the lowest level in the canopy. Of 32 commercial vars. grown in small field plots, Ackersegen, Ås, and Ontario remained green longest and gave reduced sporulation.

J. M. HIRST & O. J. STEDMAN tested 2 methods of forecasting the number of apple scab [*Venturia inaequalis*] ascospores that may be expected to form during spring [cf. **38**, p. 182]. Both depend on estimating the wt. of dead leaf remaining in orchards shortly before bud-burst. Tests of ascospore productivity on uniform area samples of leaves formed on the extension growths of unsprayed Laxton's Superb apples in May, June, July, and Aug. 1957 showed that the 1st leaves to fall in autumn produced fewer ascospores than those which fell later.

In work by P. H. Gregory it was found that spores put into the air by normal hay were typical of the dry air spora of England [cf. **37**, p. 704]. Specimens of mouldy hay put very many spores into the air; many isolates were thermophilic, growing well at 40°. The rate of spore removal from samples of mouldy hay shaken in a wind tunnel for 1 hr. decreased rapidly; in a wind of 1m./sec. (2·2 miles/hr.) 50% of the spores were removed during the 1st 2 min. J. M. Hirst & O. J. Stedman express the view that the distribution of air-borne spores in relation to height is much affected by lapse-rate. A wide range of fungus spores and pollen grains was caught [cf. **37**, p. 642], at times in high conc., e.g. 53,000 *Cladosporium* conidia/cu. m. of air at 2,000 ft. on the afternoon of 18 July 1957. Single uredospores indistinguishable from those of *Puccinia graminis* were found in 4 catches made at an altitude of 4,000–9,000 ft. over the English Channel, 30 miles S. of Portland Bill, on 4 July 1957.

Mary D. Glynne found that recent changes in the alternate wheat and fallow experiment [cf. **37**, p. 632] revealed the pronounced effect of: (1) substituting a wheat crop for fallow, and (2) thin seeding. Sown at 3 bush./acre the 1st wheat crop after fallow had only a trace of take-all (*Ophiobolus graminis*) while the 2nd was very severely stunted; sown at $\frac{1}{3}$ bush./acre, however, the 2nd wheat crop was lightly, and the 3rd very severely infected. *Cercosporella herpotrichoides*, isolated by Mary D. Glynne & Judith Cox from wheat, barley, oats, rye, and bent grass (*Agrostis stolonifera*), showed wide differences between isolates from the same and from different hosts in the numbers of spores produced on disks cut from pure cultures on potato dextrose agar, the time taken to produce eyespot lesions on wheat seedlings, and the effects of infection upon yield of grain. Judith Cox estimated the survival of *C. herpotrichoides* on 2 plots by counting the number of straws on the soil surface which produced spores of the fungus when incubated in the laboratory. In Feb.–Mar. in a section in which wheat had been grown in 1957, there was an average of 4·4 potentially infective pieces of straw/sq. yd., and 11 and 17% of the plants in the 1958 wheat crop were infected in Mar. and Apr., respectively. In a section left fallow in 1957 only 0·2 pieces of infected straw/sq. yd. were found; no infected plants were present in Mar. and only 1% in Apr.

E. W. Buxton found that 50% of 90 pea vars. in two localities were highly susceptible to wilt (*Fusarium oxysporum* f. *pisi*) [loc. cit.]. Some of the susceptible vars. had previously been found to be resistant in Holland and in New Zealand, probably because different physiologic races were concerned. No correlation was established between wilt-resistance and any particular morphological feature. Of 91 different spp. of fungi and bacteria isolated from the rhizosphere of peas 16 strongly inhibited the growth of *F. o.* f. *pisi* in culture and of these 3 displayed increased ability to inhibit when root exudate was added to the agar medium. In further work on the mechanisms underlying the decrease in pea wilt that results from the presence of *F. solani* in plants infected with *F. oxysporum* [cf. **37**, p. 633] E. W. Buxton & D. A. Perry found that water extracts from stems with foot-rot lesions contained one fraction that stimulated and one that inhibited *F. oxysporum*. When the extract was reduced to $1:10^4$ the stimulatory effect was nullified and spore germination inhibited. *F. solani* colonized the epidermis and outer cortex more rapidly and more extensively than did *F. oxysporum*. The respiration rate of plants inoculated with *F. solani* was 25% higher than that of the uninoculated controls. It is concluded that the interaction between the 2 fungi occurs during growth in the cortex, where *F. oxysporum* may be delayed in its progress to the vascular tract, wilting being delayed and ultimately decreased.

Studies by I. MacFarlane confirmed that the diffusate from the roots of cabbage seedlings grown aseptically in dilute Hoagland's solution or in dilute $CaCl_2$ stimulates spore germination by *P*[*lasmodiophora*] *brassicae* [loc. cit.]. In one experiment with a spore suspension containing initially 1·5% empty spores 60% were empty

after 2 days' incubation in solution containing root diffusate, as against 15% in solution alone.

The Report of the Soil Microbiology Dept by P. S. Nutman (pp. 68–74) includes an account of attempts by R. M. Jackson to obtain fungistatic extracts from soil with dilute acids and bases [cf. **38**, p. 188]; sterilization by passage through Ford sterimats, sintered glass filters, or by exposure to ultra-violet rays invariably removed any inhibitory activity. Bicarbonate is being studied as a possible source of soil fungistasis. Potassium bicarbonate at 0·005% depresses germination of *Penicillium citrinum* but complete inhibition is obtained only at 0·5%. As it was found that seedling roots may stimulate the germination of inhibited fungal spores in soil, exudates from germinating seeds and seedling roots were examined. Exudates from peas 24 and 48 hr. after germination stimulated the germination of *Gliocladium roseum* spores in the presence of soil and contained glucose, fructose, and sucrose. Conc. root exudates from older pea seedlings growing in nutrient solutions or distilled water neither counteracted soil fungistasis nor contained detectable amounts of sugars. Chlamydospore formation by *F. solani* occurred much more frequently in darkness than in light.

In the Report of the Biochemistry Dept (pp. 90–95), N. W. Pirie & F. C. Bawden deal with the properties of TMV [cf. **37**, p. 631]. Infectivity is destroyed by various oxidizing agents that would not be expected to affect the structure of a nucleic acid built up in the conventional way. Mitochon ria made from young tobacco leaves, especially in the presence of ethylenediamine tetra-acetate or some of the Krebs cycle substrates, induce inactivation.

In the Report of the Insecticides and Fungicides Dept under C. Potter (pp. 117–132), A. H. McIntosh points out that when making spore-germination tests with fungicides contained in drops of spore suspension in moist chambers it has been assumed that the vol. of the drop, and hence the conc. of the fungicide in it, will remain constant, but this is not so. When Böttcher's slides containing 0·3 ml. drops are maintained at a const. temp. the vol. usually decreases by about 7% in 48 hr.; the loss may amount to 47%, or water-vapour from the water seal may condense on the drop and increase the vol. by 5%. The removal by glass surfaces of Hg from neutral aqueous solutions of inorganic Hg compounds may appreciably reduce the nominal conc. of Hg; on microscope slides the losses increase with increase in temp. in the range 10–25°. The combined loss during serial dilution in soda-glass tubes and on slides is over 70% in 24 hr. Spores take up Hg rapidly from solution, with the result that in a spore-germination test the Hg will be taken up both by these and by the surface of the slide.

Gregor (J. W.). **Director's report. Potatoes.**—*Rep. Scot. Pl. Breed. Sta., 1959*, pp. 11–17, 1 col. pl., 1959.

At this Station, Roslin, Midlothian [cf. **37**, p. 549], 2 unfamiliar virus diseases of *Solanum* spp. from Mexico and Central America are to be further investigated. Genetical studies on characters associated with resistance to viruses were continued, and it was noted that in progenies derived from *S. chacoense* resistance to potato virus Y is manifested in 2 forms, a null reaction and a necrotic, hypersensitive one. Segregation data suggested that the 2 modes of response are controlled by the same dominant gene. The genetics of reaction to potato virus X in *S. acaule* were further explored in an examination of 2 large F_3 progenies after inoculation with virus strains X^L and X^B, and it was concluded that a single pair of genes controls reactions to both strains. The results of further tests with *S. stoloniferum* and *S. phureja* seedlings resistant to virus Y supported earlier indications that the resistance derived from each sp. operates against a wide array of Y viruses and not merely against specific strains.

Symptoms of barley yellow dwarf virus were not observed on any oat crop

examined though oats are widely affected in England [cf. **37**, p. 631]. With *Rhopalosiphum padi* as vector a virus was transferred from stunted *Festuca ovina* plants to oat seedlings in which it caused severe stunting and leaf malformation. A virus less damaging to oats was found in *F. ovina* plants of normal appearance, and may have been present in the stunted plants also. Neither disease was seen in oats growing near the *F. ovina*.

McKay (R.) & Loughnane (J. B.). **Plant diseases in Ireland in 1956 and 1957.**—*J. Dep. Agric. Eire*, **54** (*1957–58*), pp. 181–186, [1959].

In this report [cf. **36**, p. 376] it is stated that in July 1956 eyespot (*Cercosporella herpotrichoides*) incidence in wheat ranged from negligible to over 80% (av. 40–50%). Attacks on barley were heavier and in an area of about 35 acres in County Cork 75% of the crop was lodged. On oats the disease was less severe, but 1 field showed lodging in mid-July. Many fields of all 3 cereals which had shown only slight lesions in July collapsed badly in Aug., which was very wet. In 1957, lodging of wheat was negligible. In 1956 sharp eyespot (*Rhizoctonia* sp.) was fairly common on wheat and barley. Heat canker occurred on [linseed] oil-flax plants and potato stems in June, and bacterial canker (*Corynebacterium michiganense*) was noted on outdoor tomatoes in County Cork in July. Cereal [barley] yellow dwarf virus disease [map 332], first observed in Ireland in 1954, was ascertained to be widespread though not serious.

In July 1957 *Stemphylium botryosum* [*Pleospora herbarum*] occurred in a virulent form on onion foliage in County Kerry, killing the leaves progressively from the tips downwards in the complete absence of any other parasite. Lucerne was attacked by a fungus provisionally identified as *Colletotrichum trifolii*, apparently the 1st record of the disease in Ireland. *Helicobasidium purpureum* was recorded attacking conifers for the 1st time [**38**, p. 40].

Jahresbericht 1956/1957 der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. [Annual report for 1956–7 of the Federal Experiment Station for Fruit-Growing, Viticulture, and Horticulture at Wädenswil.]—*Annu. agric. Suisse*, (**73**, ed. fr. **60**), N.S. **8**, 1–2, pp. 55–175, 4 fig., 3 graphs, 1959.

Much of the material in this report, presented by F. Kobel [cf. **36**, p. 453], has already been noticed.

In the plant protection section (pp. 66–94) S. Blumer & J. Kundert state that karathane may be recommended for the control of apple mildew [*Podosphaera leucotricha*: **38**, p. 379]. Against *Peronospora* [*Plasmopara viticola*] of vine the organic preparations based on zineb, ziram, captan, and mesulfan should be used only for the pre-flowering and 1st post-flowering applications, the later sprays being with copper fungicides or mixtures thereof with organic preparations, which have the advantage of being more rain fast and of being active against *Oidium* [*Uncinula necator*: **38**, p. 238] and *Botrytis* [*cinerea*].

Johansson (D.). **Växtsjukdomar och skadedjur i Skåne-Halland 1958.** [Plant diseases and pests in Scânia-Halland 1958.]—*Växtskyddsnotiser, Stockh.*, *1959*, **22**, 4, pp. 64–68, 3 fig., 1959.

This report from Sweden includes brief observations on some well-known diseases

Annual Report, Cawthron Institute, Nelson, New Zealand, 1957–58.—55 pp., 1958.

In the section of this report [cf. **36**, p. 516] on diseases of tobacco (pp. 21–23) the appearance of *Sclerotinia sclerotiorum* [cf. **38**, p. 279] in many seedling beds is reported. Transplants were also destroyed. In a small-scale experiment dichlone (¾ lb./100 gal.) reduced infection in Virginia Gold seedlings by 38% without toxicity to the plants. Cases of decay by *Sclerotinia* early in the curing process were also noted, their development being favoured by previous weather conditions. *Rhizopus*

arrhizus [**36**, p. 517], which attacks at the yellowing stage of curing and is the chief fungus associated with leaf decay in the kilns, has been observed as a secondary infection following *S. sclerotiorum*. Virginia Gold colours slowly so that its leaf is exposed longer to temps. favourable to *R. arrhizus*. *Botrytis cinerea* [loc. cit.] was responsible for decay in seedling beds of Virginia Gold in the rosette stage and was also associated with decay in field plants. Tobacco mosaic virus was again prevalent and some cases of [its str., tobacco] veinbanding necrosis occurred. *Pythium debaryanum*, not previously recorded [on tobacco: cf. **23**, p. 79] in New Zealand, caused damping-off of seedlings and *P. ultimum*, another new host record, was found on transplants.

Further nutritional studies of *Phytophthora cactorum* are reported by T. Christie (pp. 33–34) [cf. **37**, p. 453]. Three sources of N ($Ca(NO_3)_2$, asparagine, and $(NH_4)_2SO_4$) were added singly to the basal medium and the initial pH of the solutions adjusted over a range 3–9. For each N series 2 sources of C (dextrose and sucrose) were used. Max. growth with $Ca(NO_3)_2$ as the N source and dextrose as the C source was attained at pH 6. With sucrose as a C source growth was relatively poor at 9. Growth in the medium containing asparagine and dextrose was uniformly good at pH 4–7. Ammonium sulphate, both with dextrose and sucrose as C sources, was a poor N source. At 6–9 inclusively growth in all media was accompanied by an increase in the acidity of the media, and at 4 and 5 the media either showed no change or became less acid at the end of the growth period.

King (J. G. M.). **Annual Report of the Department of Agriculture, Uganda, for the year ended 31st December, 1957.**—56 pp., 9 pl., 1959. 5*s*.

In paras. 114 and 115 of this report [cf. **37**, p. 6] it is noted that maize which is early maturing and resistant to rust (*Puccinia polysora*) is particularly susceptible to *Helminthosporium turcicum*. Zineb gave some control.

Annual Report on the Department of Agricultural Research, Federation of Nigeria, for the year 1957–58.—43 pp., 1959. 9*d*.

In the section of this report [cf. **37**, p. 635] on Plant Pathology (pp. 35–36) S. R. Chant reports studies on cassava mosaic virus which have already been noticed [**37**, p. 695; **38**, p. 346 *et passim*]. It has not yet proved possible to transmit the suspected virus disease of yams [**37**, p. 203] by grafting. More than 1 str. of cowpea mosaic virus [**38**, p. 294] appears to occur and local vars. are less susceptible than introduced; the virus has been transmitted to French bean [*Phaseolus vulgaris*], but to no other host. Other diseases noted include a brown rot of tobacco caused by *Phytophthora parasitica*, a leaf disease of water yams associated with *Glomerella cingulata*, and a virus disease of *Ipomoea* sp. and sweet potato. A coffee disease suggestive of Elgon dieback [**35**, p. 276] and possibly due to lack of shade was investigated in the Southern Cameroons.

Reporting on the work of the W. African Maize Research Unit (pp. 37–38), much of which has been noticed [**38**, p. 514], R. H. Cammack noted that the new virus disease of maize [**38**, p. 515], provisionally termed pellucid ring spot, is now widespread; Caribbean vars. resistant to *Puccinia polysora* were even more severely attacked than local vars. An aphid vector is suspected.

Annual Report of the Department of Agriculture, Nyasaland, for the year 1957/8. Part II.—155 pp., 14 graphs, 2 plans, 1959. 7*s*.

It is noted by the Plant Pathologist (D. C. M. Corbett) in this report [cf. **32**, p. 669] that the main disease of potatoes (p. 35) was caused by *Alternaria solani*; *Phytophthora infestans* [map 109] has not yet been recorded, though reported in Portuguese E. Africa, near the border. *Pseudomonas solanacearum* is widespread on this crop, and *Actinomyces* [*Streptomyces*] *scabies* was found occasionally. Potato leaf roll appears to be the commonest virus on potato.

On tobacco (pp. 42–43) scab (*Septomyxa affinis*) [cf. **37**, p. 134] was serious in seedbeds of dark-fired Western in the Central Province and in the field this crop was also affected by *Cercospora nicotianae, Alternaria longipes*, and the physiological red rust spotting [cf. **15**, p. 263], but not seriously. A one-sided wilt of Burley tobacco was caused by *Fusarium oxysporum*, a new record on this crop in the Lilongwe District. Turkish tobacco proved very susceptible to *S. affinis* and suffered some damage from tobacco leaf curl virus. Flue-cured tobacco was affected by *Colletotrichum tabacum* [cf. **38**, p. 295] and attempts were made to prevent its spread from the 12 estates where it was recorded.

Coffee (pp. 114–115) was affected by a disease complex associated with *Fusarium stilboides* [a form of *F. lateritium* var. *longum*: cf. **38**, p. 381]. Use of a spore trap [**36**, p. 715] showed that spores are liberated immediately after rain, chiefly with the main rains after mid-Dec., though sporadic showers occurred at other times in the rainy season. Some promise of control of Storey's bark disease [**35**, p. 449] was obtained in a trial with captan and 8-hydroxyquinolinolate. Collar rot, another condition associated with the complex, increased with additional manuring, suggesting an association with debilitation due to overbearing, a concomitant of this treatment. *Hemileia vastatrix*, still present in the Misuku Hills, was not serious. *Cercospora coffeicola* caused some damage to both foliage and berries. Stem pitting [cf. **38**, p. 381] was found in some Tanganyika vars. under trial.

C. musae [*Mycosphaerella musicola*: map 7], first found on banana in the Nkata Bay District 2 yr. ago, was again found in a neighbouring area (p. 124). *Uromyces caryophyllinus* [*U. dianthi*] was observed on some Dutch carnations imported through Southern Rhodesia.

Annual Report of the Cameroons Development Corporation, 1958.—31 pp., 4 pl. [1959].

In the section of this report [cf. **37**, p. 636] on agricultural activities (pp. 5–9) it is noted that cigar-end disease [*Trachysphaera fructigena* and *Verticillium theobromae*] of banana was unaccountably more virulent, causing the loss of 10,485 stems and necessitating control from June to Dec., often on a 2-day rather than the normal 3-day cycle; the Lacatan var. proved susceptible. Panama disease [*Fusarium oxysporum* f. *cubense*] caused the loss of 645,255 plants.

Spraying against cacao black pod [*Phytophthora palmivora*] was increased to 15 cycles, from the beginning of Feb. to late Oct. (2-weekly May–July, then 3-weekly), which gave better control than the 12 cycles Mar.–Nov. of the previous year.

Powdery mildew of rubber [*Oidium heveae*: map 4] was observed in isolated seed gardens at above 1,300 ft. and in var. Tj.16 at low elevation.

Bouriquet (G.). **Plant diseases and pests in some African territories.**—*F.A.O. Pl. Prot. Bull.*, **7**, 5, pp. 61–63, 1959.

The principal disease of coffee in the Ivory Coast is tracheomycosis (*Gibberella xylarioides*) [**38**, p. 598]; the susceptible Kouilu var. was ascertained to contain 12 mg. of chlorogenic acid in the bark and 4 in the wood/100 g. of fresh material, while the corresponding figures for the resistant Robusta were 9 and 16. In general, coffee in the Ivory Coast appears to be tolerant to rust (*Hemileia vastatrix*) [loc. cit.]; three strains of *Colletotrichum coffeanum* [*Glomerella cingulata*] have been isolated from coffee in this region.

In the [French] Cameroons, *Stachylidium* [*Verticillium*] *theobromae* and *Trachysphaera fructigena* [cf. **37**, p. 636] were not important in most banana plantations. *H. coffeicola* [cf. **38**, p. 145] was observed on Robusta coffee; at present it is less important than *H. vastatrix*, even on Arabian coffee.

At Boukoko Station [French Equatorial Africa], a mass selection of *Coffea*

excelsa was made in 1949–50 to develop vars. resistant to *G. xylarioides*. The 1st progenies have 90–100% resistance. Infection by *Sclerotium coffeicola* [cf. **37**, p. 354] on Excelsa coffee in nurseries ranged up to 55%; a 1% copper oxychloride spray gave control.

Vanilla growing on the E. coast of Madagascar was attacked by *Fusarium bulbigenum* var. *batatas*, *F. oxysporum* (a form morphologically close to vars. *nicotianae* and *cubense*, but not parasitic on tobacco or banana), and a 2nd form of *F. bulbigenum* [cf. **33**, p. 183]. The disease often attacks the subterranean parts of the root system, causing a soft rot which spreads to the aerial parts and eventually kills the plant.

Hirst (H.). **Annual Report of the Department of Agriculture, Cyprus, for the year 1958.**—64 pp., 1959. [Cyclostyled.]

In the mycological section of this report (p. 44) [cf. **36**, p. 381; **37**, p. 7] the following diseases are mentioned. Loquat scab (*Spilocaea eriobotryae*) has increased in recent years, necessitating control with proprietary fungicides. *Sclerotinia fructigena* has caused considerable damage to apricots; spraying with copper oxychloride is more effective if accompanied by pruning out of diseased twigs. Copper oxychloride and zineb 78 both controlled *Phytophthora infestans* on potato. Races 14 and 24 of *Puccinia graminis* on wheat [**36**, p. 95] were again identified, the former being the more prevalent.

Plant Pathology Division.—*Rep. Dep. Agric. Mauritius, 1957*, pp. 34–37, 1959.

Some of the information in this report [cf. **38**, p. 347] has already been noticed [**37**, p. 594; **38**, pp. 373,]. Successful control of *Isariopsis griseola* on beans [*Phaseolus vulgaris*] was obtained with murphane wettable, a zineb formulation at 2·5 g./l., 5 sprays at weekly intervals, spots/sq. in. leaf surface being reduced from 20 in the untreated to 0·7 [cf. **37**, p. 692].

Puccinia pelargonii-zonalis [cf. **36**, p. 376] caused severe damage to *Pelargonium zonale* in several areas, a new record for the island. It was not found on *P. peltatum*. A disease of *Poinciana regia* was attributed to *Pseudomonas solanacearum*, which was isolated from a dying tree and subsequently induced the disease in young plants of *P. regia* and a rapid wilt in tomatoes. The same pathogen was also responsible for a wilt of cannas. Leaf spots of zinnia (*Alternaria zinniae*) and raspberry (*Septoria rubi*) were also observed. *Glomerella cingulata* caused die-back of avocado pear.

Administration Report of the Department of Agriculture, Trinidad and Tobago, for the year 1956.—xi+76 pp., 1958. $1.25 B.W.I.

It is reported [cf. **37**, p. 71] that low volume spraying of cacao with perenox at intervals of 4–6 weeks to control black pod (*Phytophthora palmivora* [**38**, p. 586] and witches' broom (*Marasmius perniciosus*) should give increases of approx. 200 lb. dry cacao on clonal material at Perseverance Estate according to trial results (par. 96). Cacao virus [**33**, p. 214] has been found at Plum Mitan, a new focus of infection outside the Northern Range (par. 102). Spotting of grapefruit by *Diaporthe citri* is fairly widespread (par. 166). Pruning of dead wood and twigs gave some control. Russian comfrey [*Symphytum* ? *officinale*] under experiment was severely attacked by *Sclerotium rolfsii* (par. 219).

Annual Report of the Director of Agriculture, British Guiana, 1958.—iii+55+iii pp. [Received Aug. 1959. Cyclostyled.]

It is noted in this report [cf. **38**, p. 445] that the promising sugarcane var. B 49119 rated as susceptible to leaf scald [*Xanthomonas albilineans*] in a field comparison with standard vars. (par. 101). Rice blast (*Piricularia oryzae*) was worst on the E. bank of the Demerara and Berbice rivers, severely affecting 1,000 acres (par.

121). An outbreak of coconut bud rot (*Phytophthora palmivora*) occurred in the Mahaicony area (par. 156).

HEATH (R. G.). **Annual Report of the Department of Agriculture, Federation of Malaya, for the year 1957.**—ix+106 pp., 7 pl., 1958.

The conclusion of tests on the comparative susceptibility of rice vars. to *Piricularia oryzae* [**38**, p. 81] is noticed (p. 37) in this report [cf. **38**, p. 55]; Chantek puteh, Padang Trengganu 22, Morak Sepilai Kechil, Anak Ikan Gresing, and Anak Ikan China were found to be immune.

On oil palms (p. 42) basal stem rot (*Ganoderma lucidum*) continues to cause considerable damage. Previously confined almost exclusively to old palms, it has now occurred also on young ones and is potentially much more serious. A hitherto unrecorded disease occurred in Johore; large, brown, rotten areas develop on the leaflets while the fronds are still enclosed in the spear and dry out when the leaves expand, giving them a ragged appearance. A *Fusarium* sp. isolated from the affected parts of the young leaves appears from preliminary inoculation experiments to be the causal agent.

An obscure disease associated with no known parasite occurred on coconuts in the Batu Pahat area of Johore (p. 43). Premature shedding of the nuts is followed by withering and drying out of the oldest and then the younger leaves; finally the bud disintegrates and the palm dies.

A nutritional die-back (p. 52) of cacao preceded by marked leaf chlorosis has caused considerable worry at Jerangau and Serdang. From the results of leaf analysis the elements involved appear to be Ca and Mn, both lower in chlorotic than in healthy leaves, and possibly Fe; K was higher in the chlorotic leaves. Diseases observed in Malacca and Pahang during a survey started in 1956 (p. 55) included a die-back associated with *Thyronectria pseudotrichia* and thread-blight [*Pellicularia koleroga*]. *Calonectria rigidiuscula* [**36**, p. 457] was usually isolated from the extreme edge of branches affected by die-back (distinct from the nutritional disorder described above) and appears to be the primary parasite, the tissues killed by it being subsequently invaded by *Botryodiplodia theobromae* [cf. **38**, p. 359].

A *Phytophthora* sp. was isolated from tobacco plants (p. 57) with symptoms resembling those of black shank (*P. parasitica* var. *nicotianae*).

Young kapok trees [*Ceiba pentandra*] (p. 59) were affected by canker and death of infected branches caused by *Colletotrichum* sp.

Among new records (p. 60) are witches' broom of sweet potato and soybean mosaic, both suspected to be of virus origin.

Twenty-second Biennial Report, State Plant Board of Florida, 1956–58.—*Rep. Fla Pl. Bd.* **2** (*Bull.* 13), 110 pp., 14 fig., 6 graphs, 12 maps, 1959.

In the report of the Dept of Plant Pathology and Nematology (pp. 97–102) [cf. **37**, p. 207] under D. B. CREAGER, in the section on diseases of ornamentals and miscellaneous crops, A. P. MARTINEZ notes that *Helminthosporium* sp. was responsible for a leaf disease of royal palm (*Roystonia regia*) nursery plants. Diseases of orchids are dealt with by H. C. BURNETT [**38**, p. 480].

In the section on diseases of citrus and subtropical fruits H. C. BURNETT reports that rust (*Physopella* [*Cerotelium*] *fici*) [cf. **37**, p. 525] is the commonest disease of figs and may cause complete defoliation. *Cercospora fici* [cf. **8**, p. 727], though widespread, usually does little damage. Fig mosaic virus [**34**, p. 465] is not yet known in Florida.

JERKES (W. D.), NIEDERHAUSER (J. S.), BORLAUG (N. E.), MARTINEZ (E. S.), & GALINDO (A. J.). **Some plant diseases observed in Mexico in 1959.**—*Plant Dis. Reptr*, **43**, 4, pp. 500–503, 1959.

This report [cf. **36**, p. 2] from the Rockefeller Foundation Mexican Agricultural

Program, arranged under crop hosts, includes notes on the following pathogens: *Fusarium oxysporium* f. *vasinfectum* [map 362], *Ascochyta gossypii* [map 259], *Puccinia cacabata* [**37**, p. 721], and *Glomerella gossypii* [map 317] on cotton; *Helminthosporium turcicum* [map 257], *Ustilaginoidea virens* [map 347], *Physoderma maydis* [map 106], and maize stunt virus [cf. **37**, p. 533] on maize; *Sclerospora macrospora* [map 287] on wheat; *Alternaria solani* [map 89] and 'punta morada', similar to aster yellows virus, on potatoes; *Chaetoseptoria wellmanii* [**36**, p. 369] and bean yellow mosaic virus on beans [*Phaseolus vulgaris*: **36**, p. 159]; *Phytophthora capsici* [map 277] on pepper [*Capsicum* sp.]; *Bremia lactucae* [map 86] on lettuce; *P. infestans* on tomato; and *Pseudoperonospora cubensis* [map 285] and *Colletotrichum lagenarium* [map 313] on watermelon and melon.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **7**, 6, p. 80, 1959.

V. Taboada & Maria Muntañola report one of the worst outbreaks of tomato late blight (*Phytophthora infestans*) experienced in Argentina. It occurred in the N.W., at an alt. of about 300 m., where the most widely grown var. is Platense Raya Verde. The disease appeared on 1 May 1958, and during the following 2 days almost all the tomato plants succumbed over an area of 1,800–2,000 ha., 95% of the crop being lost. The few fields which had been treated regularly with manzate at intervals of 10 days since the beginning of flowering, and which had received 3–4 applications by the time of the outbreak, were saved.

It is reported from the Republic of Tchad [French Equatorial Africa] that tests on Mexican lime, sour orange, and *Aeglopsis* revealed the presence of tristeza virus in citrus trees grown at Fort Lamy [map 289].

Gattani (M. L.) & Abdulla. **Control of some important plant diseases in Afghanistan.**—*F.A.O. Pl. Prot. Bull.*, **7**, 5, pp. 64–68, 3 fig., 1959.

Powdery mildew (*Uncinula necator*), the most destructive vine disease in Afghanistan, in 1958 caused an av. loss of 50% of the grape crop in the Kodaman area and nearly 80% loss in Chardeh Gorbund and Kathagan. The disease is estimated to cause a total loss of about $5,000,000 (U.S.)/year. Perithecia are not produced, but the mycelium overwinters in cracks and on the stem surface. Almost complete control was obtained on 25,000 vines in Karazamir with a 10% lime-sulphur spray applied as an eradicant in Feb., followed by 2 protective S dustings in summer, the 1st between 5 and 24 May, the 2nd between 1 and 20 June. In the Kodaman area nearly 85% control was obtained from 2 dustings in May–June; 1 only, in May, gave 60–70% control.

Bunt (*Tilletia foetida*) is one of the chief diseases of wheat in the Hazarajat and Maimana areas, but elsewhere it does not appear to be very important. Leaf spot (*Septoria tritici*) seems to be present throughout Afghanistan; seed treatment was carried out in earthenware waterpitchers holding about 7 kg. seed; ceresan was distributed in 14 g. packets, sufficient to treat this.

In the Kabul area, Kodaman, Kandbar, and Kathagan leaf curl (*Exoascus* [*Taphrina*] *deformans* [map 192] of peach causes losses of about 20% of the crop. Effective control was given by a 5% lime-S dormant spray applied about 15 Feb. Die-back of parasitic origin but of unknown cause [cf. **38**, p. 597] is a very important disease of citrus in the Jalalabad area.

Two main vars. of sugarcane are extensively grown in Jalalabad, 'Vatani' (*Saccharum officinarum* type), and 'Parami', a Coimbatore cane. Red rot (*Physalospora* [*Glomerella*] *tucumanensis*) [map 186] is mostly confined to Vatani, causing losses up to 30% of the crop; Parami is comparatively unaffected. Sugarcane smut (*Ustilago scitaminea* [map 79]) is very serious in the Mandrawal area of Jalalabad, where up to 20% infection has been recorded; in other parts of Jalalabad the disease

is not very important. Apple scab (*Venturia inaequalis*) [map 120] is prevalent in Kabul and other parts of Afghanistan.

Puccinia graminis, *P. triticina*, and *P. glumarum* are commonly present on wheat. *P. glumarum* first appears in Jalalabad in about the 3rd week of Jan., and is followed by the other 2 rusts in Mar. In the Kabul area *P. glumarum* appears early in Apr. and the other 2 in the 2nd week of May. Nebred wheat (from the United States) is highly resistant to *P. glumarum* and *P. graminis*.

Turrill (W. B.). (Editor). **Vistas in botany.**—xv+547 pp., London, Pergamon Press, 1959. £5.

This handsome volume, published in honour of the bicentenary of the Royal Botanic Gardens, Kew, comprises 18 articles on diverse aspects of botany. Special attention may be drawn to the stimulating reviews by F. C. Bawden on viruses (pp. 291–312, 4 pl., 10 ref.), K. A. Bissett on bacteria (pp. 313–327, 2 pl., 3 fig., 46 ref.), and C. T. Ingold on fungi (pp. 348–386, 6 fig., 161 ref.). The last article has short sections on the history of mycology and on sex, physiology, dispersal, ecology, and taxonomy of fungi.

Drees (H.). **Pflanzenschutz Lexikon.** [Plant protection dictionary.]—384 pp., 127 fig., Frankfurt am Main, Verlag Kommentator, 1959. DM. 16.80.

A useful little book of reference (the 2nd edition) with concise notes on the various pests and diseases of plants, vectors, spraying equipment, and other related matters. For English readers it is particularly helpful in providing the Latin name of the parasite when only the common name of the disease is available. The final section includes an explanation of the organization of the plant protection 'offices' in the various Länder and legal notes.

Schuster (M. L.), Jones (J. P.), & Sayre (R. M.). **The effects of thiamine and temperature upon the pigmentation and growth of Bean wilt bacteria.**—*Plant Dis. Reptr*, **43**, 4, pp. 439–443, 1959.

At the Nebraska Agricultural Experiment Station, Lincoln, studies of the effects of temp. and vitamins on the pigmentation and growth of naturally occurring yellow and orange-coloured bean [*Phaseolus vulgaris*] wilt bacteria (*Corynebacterium flaccumfaciens* and *C. f.* var. *aurantiacum* [**37**, p. 195]) showed a shift in the 1st named from cream to yellow as the thiamine increases, whereas the 2nd is pink when the thiamine level favours moderate growth, and yellow and orange when the amount is well above the levels necessary for growth. Low temp. (5° C.) appears to inhibit yellow pigmentation even with > opt. quantities of thiamine. Colour differences are not related to pH.

Friedman (B. A.) & Ceponis (M. J.). **Effect of ultraviolet light on pectolytic enzyme production and pathogenicity of Pseudomonas.**—*Science*, **129**, 3350, pp. 720–721, 1959.

Of 17 cultures obtained at the Market Pathology Laboratory, New York, from bacterial suspensions of *P. marginalis* (isolated from witloof chicory) irradiated with ultra-violet light (15 watt) at a distance of 22·5 cm. for up to 10 min., 10 failed to infect leaves of witloof chicory and head lettuce, and 5 of these failed to produce pectolytic enzymes in culture [cf. **35**, p. 626; **38**, p. 565], though under similar conditions the pathogenic parent strain did so. Culturing on min. media indicated that these mutants were genetic.

Kaper (J. M.) & Veldstra (H.). **On the metabolism of tryptophan by Agrobacterium tumefaciens.**—*Biochim. biophys. Acta*, **30**, pp. 401–420, 1 col. pl., 10 fig., 11 graphs, 1958.

At the Biochemical Laboratory, University of Leyden, Netherlands, the formation

of indoleacetic acid [cf. **37**, p. 445] from tryptophane by *Agrobacterium tumefaciens* was followed by chromatographic analysis of extracts from the culture media. Breakdown products of the intermediate indolepyruvic acid were observed. Indoleacetic acid and tryptophol were identified as products of physiological origin, and under anaerobic conditions they were the main products, indolepyruvic acid being very probably their immediate precursor. By using tryptophane labelled with C^{14} in different positions, and by radioautography, conclusive evidence was obtained for the indole character of the breakdown products of indolepyruvic acid.

Lipetz (J.) & Galston (A. W.). **Indole acetic acid oxidase and peroxidase activities in normal and crown gall tissue cultures of Parthenocissus tricuspidata.**—*Amer. J. Bot.*, **46**, 3, pp. 193–196, 2 graphs, 1959.

At the Dept. of Botany, Yale University, New Haven, Connecticut, no indoleacetic acid (IAA) oxidase activity was demonstrated in dialyzed and undialyzed homogenates of either normal or crown gall (*Agrobacterium tumefaciens*) cells of *P. tricuspidata* grown in pure culture. Crown gall tissue only produced an extracellular IAA oxidase which required Mn^{++} and DCP (dichlorophenol) as co-factors; normal tissue alone contained high concs. of substances inhibiting IAA destruction by pea IAA oxidase. Peroxidase activity was higher in normal homogenates, but more peroxidase was released externally [cf. **37**, p. 382] by crown gall tissues. Thus the differences in auxin requirements and growth rate between the two tissues cannot be explained by differential auxin destruction.

Schmidt (W. A. K.) & Brucker (W.). **Zum Wachstum des crown-gall-Gewebes von Datura innoxia Mill. in vitro.** [On the growth of crown-gall tissue of *D. inoxia in vitro*.]—*Flora, Jena*, **147**, 2, pp. 242–262, 4 fig., 1 graph, 1959. [85 ref.]

At the Institut für Medizin und Biologie, Berlin-Buch, the authors removed bacteria-free tissues from primary tumours (*Agrobacterium tumefaciens*) [cf. **37**, p. 12] on *D. inoxia* and from secondary tumours (small button-shaped growths) which formed close by. Both tissues were cultured on White's medium with added saccharose, malt extract, and agar. The secondary material grew considerably faster than the primary with a distinct opt. after addition of 10^{-9} g./ml. indole-3-butyric acid, whereas the growth of the latter was not visibly affected. The secondary tissue differed from normal in requiring no added growth substance. Growth was parenchymatous, without differentiation, apart from interspersed tracheids. After homoplastic transplantation of both primary and secondary tissues to healthy *D. inoxia* plants, tumours formed which were outwardly identical with bacterial tumours. Tumours from secondary tissues formed organoids. On the tumours which appeared when secondary tissue was transplanted to *D. stramonium* var. *tatula*, small organoids developed which bore glandular hairs of *D. inoxia*.

Bünzli (G. H.) & Büttiker (W. W.). **Fungous diseases of Lamellicorn larvae in Southern Rhodesia.**—*Bull. ent. Res.*, **50**, 1, pp. 89–96, 1959. [36 ref.].

In an exceptional instance of epidemic mycosis among larvae of the tobacco pests *Anomala exitialis* and *Schizonycha profuga*, the fungi were *Torrubiella* sp. (most prevalent), *Beauveria bassiana*, and *Metarrhizium anisopliae*. Soil with an abnormally high content of nitrogenous organic matter favours the breeding of the 2 insects but at the same time provides a suitable medium for the survival and development of a high degree of virulence in the pathogens.

Jolly (M. S.). **Un cas d'enchaînement : blessure avec infection cryptogamique à Trichothecium roseum Link. chez le Lepidoptère Bombyx mori L.** [A case of

chain-effect: a wound with fungal infection by *T. roseum* in the Lepidopter *B. mori*.]—*Ann. Épiphyt.*, **10**, 1, pp. 37–43, 4 fig., 1959.

In Sept. 1957, among Bagdad silkworms raised at Saint-Christol-les-Alès, Gard, France, one developed a wound which a day later showed signs of fungal infection. The silkworm had a reduced appetite and after a further 2 days began to turn black in the affected part, this being followed by paralysis; on the 3rd day it was able to move only the thoracic part of its head. *T. roseum* was isolated from the still living silkworm.

The fungus was highly virulent when injected into the haemolymph of *B. mori*, killing the insects in a few days, but no mortality resulted when silkworms were fed on experimentally infected leaves. The fungus was also demonstrated to be unable to attack silkworms through the healthy epidermis. *T. roseum* was able to grow on a wound inflicted on a silkworm which was in process of healing and set up a localized mycosis which later became generalized and fatal.

Drechsler (C.). **Two new species of Harposporium parasitic on nematodes.**—*J. Wash. Acad. Sci.*, **49**, 4, pp. 106–112, 31 fig., 1959.

H. baculiforme and *H. sicyodes* are described from the Crops Research Division, United States Dept of Agriculture. Neither produces crescent-shaped conidia, but both resemble *H. anguillulae* in forming their conidia mostly on slender sterigmata arising from globose cells borne laterally on hyphal elements extended from the parasitized animals [unidentified].

Pramer (D.) & Stoll (N. R.). **Nemin : a morphogenic substance causing trap formation by predaceous fungi.**—*Science*, **129**, 3354, pp. 966–967, 1 fig., 1959.

Trap formation [**35**, p. 15] by the mycelium of *Arthrobotrys conoides* was stimulated by broths in which the nematode *Neoaplectana glaseri* had developed axenically: the active principle (nemin) extracted from worm-free culture filtrates is as yet unidentified.

Frear (D. E. H.). **Pesticide handbook.**—250 pp., Pennsylvania State College, College Science Publishers, 1959. $1.75.

This revised 11th edition [cf. **37**, p. 639], which follows the customary lines, lists 7,041 products.

Schnicker (J. L.). **Kemikaliekontrollen i finansåret 1957–58.** [Inspection of chemicals in the financial year 1957–58.]—*Tidsskr. Planteavl*, **62**, 5, pp. 841–855, 1959.

A report on the usual lines [cf. **37**, p. 446].

Specialpræparater anerkendte af Statens Forsøgsvirksomhed i Plantekultur til bekæmpelse af plantesygdomme og skadedyr. Gyldig for året 1959. [Special preparations approved by the State Experimental Service in Plant Cultivation for the control of plant diseases and pests. Valid for the year 1959.]—*Tidsskr. Planteavl*, **62**, 5, pp. 741–764, 1959.

This list [cf. **37**, p. 446] comprises all the plant protectives officially approved for use in Denmark during 1959.

Links (J.). **Some remarks on the Van Raalte test for the translocation of fungicides through plant tissues.**—*Tijdschr. PlZiekt.*, **64**, 4, pp. 333–334, 1958.

Van Raalte [cf. **35**, p. 910] reported the translocation, from a disk of wet filter paper through a 5 mm. section of potato petiole to an agar plate, of 2,4,6-trichlorophenoxyacetic acid and tetramethylthiuram monosulphide (TMTM), but not of 2 dithiocarbamates, from which he drew the conclusion that there was no correla-

tion between water solubility and systemic activity. The present author believes that the method described only gives translocation with lipoid-soluble fungicides. The walls of the parenchyma of potato petiole very probably contain lipoids (suberin, cutin) in fair quantities, causing introduced lipoid-soluble substances to spread rapidly, possibly by capillary forces, *via* the interphases of the intercellular spaces of the phloem parenchyma. Both of the substances found by Van Raalte to be translocated are lipoid-soluble and not very water-soluble. It is pointed out that after passing the probably continuous lipoid phase of the petiole the fungicides must pass a 'water barrier' on entering the nutrient agar.

Govindarao (P.) & Subbaiah (J.). **Field testing of fungicides.**—*Indian Phytopath.*, **10**, 1, pp. 50–54, 1957.

During fungicide trials started in July 1954 at the College of Agriculture, Bapatla, the 1st treatment was applied 21 and 12 days after sowing tobacco and chilli beds, respectively, followed 2 days later by a spray of pure culture of *Pythium aphanidermatum* [cf. **32**, p. 177]. The chilli beds received 1 more fungicidal spray after 10 days and another fungus spray, while tobacco beds received 2 more of each. Damping-off started at the beginning of the 4th week in the tobacco beds and at the end of the 2nd week in chilli beds; dead seedlings were removed from the beds either with forceps or by hand, and were examined for *P. aphanidermatum*.

The above experiment was repeated, the beds being sown with chilli on 7 Aug. and tobacco on 10 Aug. Bordeaux mixture (1%), 0·4% cupravit, and 0·4% fungimar (a copper oxide product) were the best and were equally effective in the 4 experiments, the mean percentage incidence of damping-off for all 4 experiments being 22·17, 27·21, and 27·48, respectively, compared with 53·96 in the unsprayed; T.B. 4452b, dithane Z78, and wettable ceresan were as effective as 1% Bordeaux in 2 experiments, while wettable S was as effective in 1 and came 4th in order of merit. As wettable S costs Rs. 1/lb. and the copper fungicides Rs. 2.8/lb. an evaluation of wettable S at higher conc. is desirable.

Byrde (R. J. W.) & Woodcock (D.). **Fungicidal activity and chemical constitution. VII. A study of the structural specificity of seven fungicides.**—*Ann. appl. Biol.*, **47**, 2, pp. 332–338, 1959. [30 ref.]

In further studies at Long Ashton Research Station, University of Bristol [cf. **37**, p. 640], relative saturation was used instead of dosage as the abscissa for analysis of saturation response data (denoted by the symbol RS, RS_{50} corresponding to the conventional term ED_{50}, where dosage is plotted against response). The RS_{50} of the following fungicides, in dilute McIlvaine buffer with sucrose, required for 50% inhibition of conidial germination of *Sclerotinia laxa* were determined as: phenylmercuric chloride, 0·0002; nystatin, 0·028; dichlone, 0·034; copper-8-quinolinolate, 0·039; 2:4-dichloro-6(*o*-chloroanilino)-*s*-triazine, 0·131; captan, 0·132; bis-(5-chloro-2-hydroxyphenyl) methane, 0·234.

The low value obtained for phenyl mercuric chloride indicates that the fungitoxicity of this compound results from a reaction with cell components, the enzyme systems being inactivated by reaction with essential -SH groups, protein denaturation being produced in enzymes not containing these groups. Nystatin, dichlone, and copper-8-quinolinolate (RS_{50} values approx. 0·03) appear to form an intermediate group; the activity of each appears to involve a chemical reaction but accumulation in the cell is probably also an important factor. The remaining group consists of 3 compounds with RS_{50} values $> 0·1$, which is typical of structurally non-specific toxicants. The available evidence indicates that the ability of captan to accumulate within the fungal spore may be the most important factor in its fungistatic activity.

The highest RS_{50} value obtained was 0·23 for bis-(5-chloro-2-hydroxyphenyl)

methane. This value indicates a structurally non-specific mode of action. It seems likely that RS_{50} values may prove useful in forecasting the field performance of fungicides.

Rich (S.). **Reversal of captan fungitoxicity by l-histidine.**—*Phytopathology*, **49**, 5, p. 321, 1959.

Studies at the Connecticut Agricultural Experiment Station, New Haven, showed that whereas captan at 3×10^{-5} M completely inhibited the growth of *Monilinia* [*Sclerotinia*] *fructicola* in a liquid medium, this toxicity was reversed by 10^{-2} M l-histidine and 10^{-2} M l-cysteine, the former still being effective if added 24 hr. after the captan and the latter after 6 hr. but not 24, indicating that l-histidine acts within the cell. The amounts of captan present and l-histidine needed for reversal were not proportional. It would appear that *S. fructicola* can shunt every system poisoned by captan except those needed for synthesis or utilization of histidine [cf. **37**, p. 574].

Lukens (R. J.). **Chemical and biological studies on a reaction between captan and the dialkyldithiocarbamates.**—*Phytopathology*, **49**, 6, pp. 339–343, 2 graphs, 1959.

These further studies [cf. **37**, p. 574], from the Connecticut Agricultural Experiment Station, New Haven, indicate that a combination spray of captan and a metal dimethyldithiocarbamate (DDC) might result in a residual mixture of captan, DDC-metal, and tetramethylthiuram di- and monosulphides, a combination of potential value against several fungal diseases.

Dugger (W. M.), Humphreys (T. E.), & Calhoun (Barbara). **Influence of N-(trichloromethylthio)-4-cyclohexene-1,2-dicarboximide (captan) on higher plants. I. Effect on the morphology and gross metabolism of root tissue. II. Effect on specific enzyme systems.**—*Amer. J. Bot.*, **45**, 9, pp. 683–687, 3 graphs, 1958; **46**, 3, pp. 151–156, 2 graphs, 1959.

At Florida Agricultural Experiment Station, Gainesville, captan was found to have no effect on the respiration of root tips of pea, maize, and squash seedlings as measured by the conventional methods, but radioactive C^{14} indicated that the outer cells in contact with captan contribute more CO_2, the recovery of which is inhibited by the presence of the fungicide.

Captan inhibited yeast hexokinase [cf. **35**, p. 835], but not wheat germ or pea seedling hexokinase, and together with its phthalimide and hexahydrophthalimide analogues inhibited decarboxylation of pyruvate and α-ketoglutarate by lupin mitochondria; this was reversed at low concs. by adding cocarboxylase, but this enzyme was ineffective in reducing the inhibition by captan and its hexadehydro analogue of the oxidation of ribose-5-phosphate by pea extract.

Lewis (W. R.). **Organotin compounds as fungicides.**—*Chem. Prod.*, **21**, 12, pp. 431–432, 1958.

In this general note from the Tin Research Institute further mention is made of brestan [**38**, p. 58]. It is pointed out that organo-tin products, which decompose to inorganic tin oxide, do not have the disadvantage of Hg, As, and Cu products, which can contaminate the soil if used continuously over the years.

Rao (P. G.) & Subbaiah (J.). **Merculine—a promising soil fungicide.**—*Indian Phytopath.*, **11**, 1, pp. 76–78, 1958.

In field tests at the College of Agriculture, Bapatha, Andhra State, against capsicum wilt (*Sclerotium rolfsii*) [**36**, p. 229], 2 drenches of merculine (1 oz./5 gal.) resulted in no wilt in 68 plants in severely infested soil, the figures for cupravit (¾ oz./gal.)

being 11·11% wilted in 54 plants, fungimar [**38**, p. 663] ($\frac{3}{4}$ oz.) 18·18% among 55, and the untreated 30·26% among 76. In a second test one drench of merculine (1 gal./20 plants) gave only 2% wilted plants among 150, as against 20% for the untreated. Merculine was also highly fungicidal to agar disks of the fungus in 2 types of soil.

Slavėnas (J.). **Baltosios ir Sareptinės Garstyčių fitoncidų dinamika jų vegetacijos periodo eigoje.** [The dynamics of the phytoncides of White Mustard and Chinese Mustard during growth.]—*Darb. biol. Inst., Vilnius*, **3**, pp. 189–212, 1958. [Russian summary.]

In further studies at the Biological Institute, Vilnius, Lithuania [cf. **38**, p. 242], *Sinapis alba* and *Brassica juncea* were shown to contain phytoncides exerting a toxic action on *Aspergillus niger*, *Fusarium oxysporum*, *F. culmorum*, and *Botrytis cinerea*. Phytoncides are present in all organs. Their quantity, however, constantly changes according to the various phases of development, the max. in *B. juncea* occurring in seeds, flowers, and flower buds, and in roots, leaves, and germinating seeds of *S. alba*, max. production coinciding with flowering in *B. juncea* and with pod development in *S. alba*. The quantity in individual organs undergoes regular change in conformity with the quantity in the green parts, especially the leaves. This indicates that the phytoncide substances are produced as secondary products during photosynthesis. In senescent and dying organs the quantity diminishes, the substances, apparently, passing into the seed or decomposing. They accumulate in quantity in organs infected by parasites. The fungicidal properties of distillates prepared from powdered mustard seed, especially *S. alba*, treated with ether, are considerably enhanced. Seed is the best material for extraction.

Courshee (R. J.) & Valentine (R. W.). **Use of plaster of Paris for recording spray drops.**—*J. agric. Engng Res.*, **4**, 1, pp. 62–65, 1 graph, 1959.

At the National Institute of Agricultural Engineering, Wrest Park, Silsoe, Bedford, plaster of Paris has been used as a receiving surface for sprays in the standard drop size range of 30–1,000 μ dyed with 1% nigrosine G 140 [cf. **35**, p. 909]. A clean, smooth surface of a cast made from 1 part by wt. of water: 2 parts $CaSO_4$ hemihydrate gives a reproducible and constant spread factor for water of $3{\cdot}8 \pm 0{\cdot}1$, with an estimated observation error of 7 μ throughout the entire range.

Newhall (A. G.) & Gunkel (W. W.). **Efficient incorporation of granular fungicides and other chemicals in the root zone of cultivated soils.**—*Plant Dis. Reptr*, **43**, 1, pp. 111–114, 2 fig., 1 diag., 1959.

At Cornell University, Ithaca, New York, tests run on sandy soil to compare the mixing abilities of several tillage implements, such as a spike tooth harrow, disk, and rotary tiller with knives and with spikes, gave results strikingly in favour of rotary tools with L-shaped blades.

Resplandy (Renée). **Les maladies parasitaires des principales cultures tropicales. Revue bibliographique. 22.** [The parasitic diseases of the principal tropical crops. A bibliographical review. 22.]—*Rev. Mycol., Paris*, **24**, 1, pp. 65–77, 1959. [93 ref.]

Further notes in this series [**38**, p. 177] are based on world literature published mainly during 1957–8.

Leather (R. I.). **Diseases of economic plants in Ghana other than Cacao.**—*Bull. Ghana Minist. Fd Agric.* 1, vii+40 pp., 1959.

This useful publication brings up to date an earlier work by Bunting and Dade [**4**, p. 495], long out of print. After a short introductory section on plant diseases

and their control in general the crops concerned are listed in alphabetical order and their principle diseases, with control methods, are described in simple terms. The whole is based on departmental records and the writer's own observations.

Nance (Nellie W.). **Some new and important plant disease occurrences and developments in the United States in 1957.**—*Plant Dis. Reptr, Suppl.* 251, pp. 39–79, 8 maps, 1958.

Compiled on the usual lines [cf. **37**, p. 442], most of the information in this report has already been noticed.

Rootrot and related literature.—*Plant Dis. Reptr, Suppl.* 252, pp. 83–158, 1958. [543 ref.]

This annotated bibliography, prepared by the Science Service Laboratory, Harrow, Ontario, from periodicals published in 1957, covers all forms of soil organisms related to root rot, soil fungicides and control, associated methods and techniques, nutrition, inoculum potential, and toxins and other substances of biotic origin. There is also a senior author index.

Braun (A. C.). **The role of toxins and other metabolites in the causation of disease in plants.**—*Trans. N. Y. Acad. Sci.*, Ser. II, **21**, 7, pp. 613–619, 1959. [16 ref.]

The pathogens selected to illustrate this critical survey of up-to-date information include *Erwinia carotovora*, tobacco wildfire [*Pseudomonas tabaci*], *Helminthosporium victoriae* on oats, *Gibberella fujikuroi* on rice, and crown gall (*Agrobacterium tumefaciens*).

Davet (P.). **Relations entre les plantes de couverture et les maladies des cultures industrielles.** [Relations between cover plants and the diseases of industrial crops.]—*Rev. Mycol., Paris*, **24**, 1, pp. 1–12, 1959. [28 ref.]

The author discusses the literature on the relations between the parasites of industrial crops and their associated cover crops. He deals with parasites common to both and with the effect of the cover crops in favouring or inhibiting their development. Parasites common to cover crops and to some of the chief industrial crops (including tea, coffee, cacao, rubber, and citrus) are listed under diseases of the root and collar; of the trunk and branches; of the leaves and flowers; and diseases affecting seedlings and nursery-plants. The relative resistance of certain cover crops to parasitic fungi is mentioned and reference made to biological races of fungi.

Hildebrand (E. M.). **Importance of microscopic openings in vector transmission of plant viruses and bacteria.**—*Plant Dis. Reptr*, **43**, 7, pp. 715–718, 4 fig., 1959. [20 ref.]

Reviewing pertinent literature and summarizing his own studies the author considers that the virus infection of plant epidermal cells in general calls for the production of microscopic wounds ($< 6\mu$ diam.), the simultaneous pulsing action of protoplasm (about $\frac{6}{10}$ sec.) through the wound opening for virus entry, and rapid healing to insure survival of both host cell and virus. Introduction of viruses into the phloem by deep-feeding arthropods appears to be governed by the same criteria.

Prevention of mold on export goods. III. Effect of pH on the growth of molds on extracts of timbers. IV. Antifungal activity of some fungicides against typical species of molds. V. The growth of molds and the components of Bamboo woods. VI. Classification of mold strains grown on various industrial manufactures and the growth of molds on Bamboo goods. VII. Identity of molds growing on various industrial manufactures and on Bamboo goods. VIII.

Antifungal activity of various fungicides.—*Hakkô Kyôkaishi*, **15**, pp. 340–344, 419–428, 532–537, 1957; **16**, pp. 174–180, 201–208, 398–402, 1958. [Abs. in *Chem. Abstr.*, **52**, 11, cols. 9594g–9595, 1958; **53**, 10, col. 9551j, 1959.]

Sections III, IV, VI, and VII of these studies are contributed by H. Iwamoto, K. Kurihara, & M. Shiga, V by H. Iwamoto & M. Shiga, and VIII by M. Kikuchi.

The moulds investigated at the Fermentation Research Institute, Chiba, Japan, made good growth at pH 3·4–8, while *Aspergillus niger* was also able to develop at 2. Growth was inhibited by the treatment of bamboo with a buffer solution of pH 8·5–10.

Of 4 compounds tested against 120 representative spp., pentachlorophenol was the most effective, followed by trimethylhexadecylammonium pentachlorophenolate. A relatively high degree of resistance was shown by *A. niger*, *P*[*enicillium*] *citrinum*, *Pythium ultimum*, *A. candidus*, *Sterigmatocystis japonica* [*A. japonicus*], *Diplodascus albidus*, *R*[*hizopus*] *nigricans* [*R. stolonifer*], *Carpenteles javanicus*, and *Cladosarum olivaceum*.

Bamboo wood was found to contain more water-soluble carbohydrates and N compounds than the other woods examined, besides maltose, sucrose, and glucose as component sugars of glycosides, and glucuronic acid as a component of hemicellulose. The free sugars comprised about 1% of the wood and the water-soluble N compounds 0·2%, of which 60% consisted of tyrosine, valine, leucine, asparagine, and aspartic acid.

More than 234 spp. of moulds were found to attack leather, wool, silk, wood, paper, cotton, gum, paint, synthetic resin, cement, and inorganic substances.

The activity of chlorinated phenols against 30 spp. was closely connected with the number of Cl atoms, being strengthened by an increase of substituted Cl. Considerable activity was exerted by 2,5-dinitrophenol and phenylphenol but not by *p*-nitrophenol. The *m*- and *p*-derivatives of chlorophenol were more effective than the *o*-. The max. activity was shown by pentachlorophenol, while its Al, Fe, and Na salts were also efficient. *R. stolonifer*, *A. flavus*, *A. japonicus*, *Fusarium moniliforme* [*Gibberella fujikuroi*], and *A. niger* proved highly resistant to the chlorophenols, while the nitrophenols were largely ineffectual against *A. flavus*, *A. japonicus*, and *Penicillium luteum*.

Wilkins (V. E.). **Third report of the working party on phytosanitary regulations (Bad Godesberg, 18–20 March, 1959).**—23 pp., Paris, European and Mediterranean Plant Protection Organisation, 1959. [With French version.]

The 3rd meeting [cf. **36**, p. 751] agreed on the basic principles to be considered by Governments in the framing of phytosanitary regulations, which are detailed. It would be desirable if the F.A.O. phytosanitary certificate [cf. **34**, p. 280; **35**, p. 224] were combined with the 'model' certificate recommended for general use at the International Plant Protection Conference held at Peking in Aug. 1956. The texts of both are appended. Other relevant matters dealt with include the certification of produce re-exported by a 'transit' country; the question of the legal ownership of the phytosanitary certificate, which should be addressed by one plant protection service to another; the inspection of nurseries in various countries; and the international trade in seed potatoes.

With reference to the last point, commercial control of *Fusarium caeruleum*, *Phoma foveata*, *Oospora pustulans*, and *Streptomyces scabies* can be achieved by treatment (within 24 hr. of lifting) with organo-mercurials, and of blight [*Phytophthora infestans*], while still surface-borne, also by disinfection, and in addition *Rhizoctonia* [*Corticium*] *solani* has been substantially controlled experimentally at 80–100° F. The washing and disinfection of seed potatoes should be the concern of the Plant Protection Service of the exporting country.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **7**, 5, pp. 71–72, 1959.

Decree No. 1936 of 26 Sept. 1958, published in the *Diario Oficial* 29793, 17 Oct. 1958, regulates the importation of cacao into Colombia.

Details are given of an Ordinance of 20 Feb. 1959 (Federal Republic of Germany) which amends the Plant Inspection Ordinance of 23 Aug. 1957 [**37**, p. 264].

Decree No. 344 (Nicaragua) of 13 Aug. 1958 promulgates a new plant protection law providing for the establishment of a Plant Protection Dept in the Ministry of Agriculture and specifying the regulatory powers of the Ministry and the powers of inspectors.

Plant Pests (Amendment) Ordinance 1958 (Ordinance No. 5 of 1958), published in the Supplement to the *Seychelles Gazette* of 15 Sept. 1958, repeals and replaces Sections 5 (dealing with plant importations), 6, and 17 of the Plant Pests Ordinance of 27 June 1915.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **7**, 6, pp. 81–82, 1959.

Ministerial Order of 2 Jan. 1959, issued by the Ministry of Agriculture and published in *Diario Oficial* 4, 6 Jan. 1959, regulates the importation into Brazil of plant material of Para rubber.

Surinam Government Decree No. 96 of 2 Dec. 1958, amended by Government Decree No. 13 of 16 Feb. 1959, supplements Government Decrees of 28 Sept. 1928 and 13 Jan. 1932, governing the importation of living plants, parts thereof, and their packings.

Details are given of the United Kingdom (England and Wales) Importation of Potatoes Order, 1959, which became operative on 25 Feb. 1959 and re-enacts with modifications the restrictions on the importation of potatoes in the Importation of Plants Order 1955 [**35**, p. 747], revoked by the Importation of Plants (Amendment) Order 1959.

From the United States it is reported that a Foreign Quarantine notice of 8 Sept. 1958, published in *Fed. Reg.*, **23**, 178, 11 Sept. 1958, amends Quarantine No. 37, relating to the importation of nursery stock, plants, and seeds. Under the provisions of Quarantine No. 56, a number of fruits are authorized for importation without treatment, and their seeds, even with pulp, if imported for propagation.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **7**, 7, pp. 103–104, 1959.

Republic of the Philippines [**34**, p. 281] Administrative Order No. 2 of 23 Dec. 1958, published in *Off. Gaz.*, **55**, 5, 2 Feb. 1959, revises that of 17 Sept. 1954 concerning the importation of plant material. Plant Industry Administrative Order No. 12 (**55**, 8, 23 Feb. 1959) revises that of 18 Aug. 1949 regulating the importation of cacao plants and plant parts to exclude diseases.

Amtliche Pflanzenschutzbestimmungen. [Official plant protection regulations.]—*Pflanzenschutz*, N.F., **12**, 1 (July), pp. 1–46; 2 (Sept.), pp. 47–95, 1958.

This publication, of which numbers are published at intervals by the Biologische Bundesanstalt für Land- und Forstwirtschaft [cf. **15**, p. 464], records *inter alia*, directives issued under plant protection regulations in all countries.

Harley (J. L.). **The biology of mycorrhiza.**—xiv+233 pp., 11 pl., 5 fig., 2 diag., 8 graphs, London, Leonard Hill (Books) Ltd., 1959. [409 ref.] 55*s*.

In this contribution to the Plant Science Monographs series a brief historical review is followed by a consideration of mycorrhizal formation in the light of modern knowledge of the relationship of roots to the soil flora. The next section deals with ectotrophic mycorrhizas and includes 4 chapters, covering structure, development, and habitat, the nature and biology of the fungi, and their relevance to the interpretation of ecological behaviour. Much of the evidence discussed

relates to trees. The final section reviews the extent of our knowledge of endotrophic mycorrhiza in 6 chapters. An extensive bibliography is followed by a subject and an author index.

Sobotka (A.) & Materna (J.). **Forest seedlings and mycorrhiza development on fly ash.**—*Nature, Lond.*, **183**, 4667, pp. 1066–1067, 1959.

Investigations by the Forestry and Game Management Institute, Zbraslav-Strnady, Czechoslovakia, on the effects of fly ash on vegetation, carried out near a coal power plant in Central Bohemia using black coal, showed there to be no harmful effects on forest tree spp. or on herbaceous vegetation, although the fly ash apparently contained unfavourable elements. In this abnormal environment the mycorrhizal development, studied in 8 tree spp., appeared to be quite normal.

Moser (M.). **Der Einfluß tiefer Temperaturen auf das Wachstum und die Lebenstätigkeit höherer Pilze mit spezieller Berücksichtigung von Mykorrhizapilzen.** [The effect of low temperatures on the growth and viability of higher fungi with special regard to the mycorrhizal fungi.]—*Sydowia*, **12** (*1958*), 1–6, pp. 386–399, 1959. [English summary. 20 ref.]

It is reported from the Forstl. Bundesversuchsanstalt Mariabrunn, Bodenbiologisches Institut, Imst, Austria, that while spring- and autumn-fungi, mountain fungi, wood-inhabiting-fungi, etc. can withstand long periods of freezing (4 months at −11 to −12° C.), or grow at low temp. (0–5°), or both, there is a fairly pronounced strain specificity regarding low temps., less pronounced in the case of strains isolated from the sunny and the shadowy sides of valleys. Mycorrhizal inoculum for plants destined for high altitudes should come from strains appropriately adapted.

Bedi (K. S.). **The role of stale products in the formation of sclerotia of Sclerotinia sclerotiorum (Lib.) de Bary. Effect of ultra-violet radiation of sclerotia of S. sclerotiorum (Lib.) de Bary on the speed of their germination and apothecial development. Effect of other micro-organisms on the growth and sclerotial formation of S. sclerotiorum (Lib.) de Bary. Refrigeration of cultures of S. sclerotiorum (Lib.) de Bary as a stimulus to the production of a second crop of sclerotia.**—*Indian Phytopath.*, **11**, 1, pp. 29–36, 4 fig.; pp. 37–39; pp. 40–48, 5 fig.; 2, pp. 110–115, 2 fig., 1958.

In studies at the Government Agricultural College and Research Institute, Ludhiana, Punjab, the addition of staling products from 4-week old cultures in Richards' solution of the sclerotial Punjab race of *S. sclerotiorum* [**36**, p. 610] to fresh potato dextrose agar cultures very greatly increased the number, size, and rate of formation of the sclerotia. Even the central part of the culture produced sclerotia abundantly. A mycelial Canadian mutant [**38**, p. 9], which ordinarily does not form sclerotia, did so when staling products from the Punjab race were added, though its own staling products did not produce this effect. Sclerotial formation by the Punjab race was prevented when the staling products were removed as soon as formed.

In the 2nd paper it is stated that exposure of the sclerotia to ultra-violet radiation for 30 min.–2 hr. had no deleterious effect, hastened germination, and increased the number of normally expanded apothecia and the number of apothecial processes from a single sclerotium; 1 hr. exposure was opt. for inducing germination in min. time (12 instead of 32 days) after they had been floated on water. This period also gave 100% effective and normal germination, as against only 17·4% of stipes with normally expanded apothecia in the non-irradiated series, and increased the number of emergant stipes from 1 sclerotium by about 145%.

In the 3rd paper work is described which demonstrated that *Bacillus subtilis* has a strongly adverse effect on the Punjab race at 22–25° C., completely inhibiting

sclerotial formation and eventually killing the fungus. At 10–20° the fungus can maintain itself in competition with the bacillus and at 5° it over-runs it. At 10° *S. sclerotiorum* suppresses *Trichoderma lignorum* [*T. viride*], which begins to exercise its adverse effect at 15° and at 20° suppresses sclerotial formation to a great extent, doing so completely at 25–30°. *Fusarium* sp. isolated from the sclerotia of the Punjab race was a serious competitor because of the latitude of its temp. requirements; it suppressed sclerotial formation altogether at 30°. The Canadian non-sclerotial mutant produced well-developed sclerotia when grown with the sclerotial Punjab race or its own sclerotial parent.

In the 4th paper it is stated that refrigeration at −25° for 1–28 days stimulated the central part of a culture to produce abundant mycelium giving rise to a new crop of sclerotia with a yield in most cases of about 80% of the original crop at the periphery; at −2° a new crop of sclerotia was produced only after 3 or 4 weeks. Such sclerotia were larger and heavier than non-refrigerated. The method failed, however, with a non-sclerotial mutant until it mutated back to a sclerotia-forming type.

Naguib (K.). **Growth and metabolism of Aspergillus nidulans Eidam in surface culture.**—*Canad. J. Bot.*, **37**, 3, pp. 353–364, 6 graphs, 1959. [42 ref.]

An account of physiological studies at the University of Cairo on the utilization by *A. nidulans* of glucose, fructose, sucrose, and maltose sources favourable for fat formation, with special reference to the modes of uptake, and the consequent carbohydrate, protein, and fat content of the mycelium at different stages of growth.

Cooper (J. A. D.), Smith (W.), Bacila (M.), & Medina (H.). **Galactose oxidase from Polyporus circinatus, Fr.**—*J. biol. Chem.*, **234**, 3, pp. 445–448, 4 graphs, 1959.

Studies at the Northwestern University Medical School, Chicago, and the Institute of Biology and Technological Research, Curitiba, Brazil, on galactose oxidase, a metalloenzyme with flavin mononucleotide and Zn as prosthetic groups, present in the medium on which *P. circinatus* has grown, showed the enzyme to oxidize galactose to γ-galactonolactate in the presence of O, with the production of H_2O_2.

Redemann (C. T.) & Meuli (L. J.). **Senecioate as a precursor of gibberellic acid in Fusarium moniliforme.**—*Naturwissenschaften*, **46**, 11, pp. 382–383, 1959.

At the Dow Chemical Company, Seal Beach, California, *F. moniliforme* [*Gibberella fujikuroi*] str. NRRL-2284 was grown in pure culture at 25° C. in bottles containing 12 l. of a synthetic medium and 360 g. sucrose with or without $NaC_2H_3O_2.3H_2O$ or Na senecioate at 50–200 mg./l. Each bottle was inoculated with 200 ml. of a suspension containing approx. 1 g. of rapidly growing cells and the amount of gibberellin production determined after 4–6 days.

Yields of the growth substance were significantly increased by the addition of Na senecioate to the medium, denoting that senecioic acid is a forerunner of at least 1 gibberellin-like substance. In fact, the pure gibberellic acid [**35**, p. 700] isolated from a fermentation supplemented by 0·04 millicuries of senecioic acid-3-C^{14} counted 279 counts/min./mg. compared with only 3·9 for the dried mycelium. Since the specific activity of the compound obtained from the tagged senecioic acid was more than 70 times as great as the mycelial body producing it the writers are convinced that senecioate must enter gibberellic acid biosynthesis by a direct route rather than through an indirect path involving degradation into much smaller units followed by recombination.

Kiermayer (O.). **Papierchromatographische Untersuchungen über den Wuchsstoffgehalt von Capsella bursa pastoris nach Infektion mit Albugo candida und**

Peronospora parasitica. [Paper chromatographic studies of the growth substances of *C. bursa pastoris* after infection by *A. candida* and *P. parasitica.*]—*Öst. bot. Z.*, **105**, 5, pp. 515–528, 2 fig., 2 graphs, 1958.

These studies, accompanied by anatomical investigations, at the Österreichische Stickstoffwerke A.G., Linz/Donau, demonstrated a much higher content of indole-3-acetic acid and indole-3-acetonitrile in infected plants. This leads to a transformation of the normal phloem prosenchyma to parenchymatous thick-walled cells. The possible roles of growth-promoting and -retarding substances in the differentiation of mechanical tissues are discussed.

Virtanen (A. I.). **Aspects on antimicrobial substances in cultivated plants.**—*Atti Ist. bot. Univ. Pavia*, Ser. 5, **16**, pp. 162–179, 2 graphs, 1959. [36 ref.]

A summary of the author's views on the subject [**38**, p. 256 *et passim*] presented to the Italian Society of Experimental Biology, Pavia section, on 29 May, 1958.

Mitchell (J. W.), Smale (B. C.), Daly (E. J.), Preston (W. H.), Pridham (T. G.), & Sharpe (E. S.). **Absorption and translocation of the F-17 antirust complex by Bean plants and subsequent effect on the rust fungus Uromyces phaseoli typica.**—*Plant Dis. Reptr*, **43**, 4, pp. 431–436, 1959.

In an investigation by the U.S. Dept Agric., Beltsville, Maryland, and Peoria, Illinois, the ability of bean [*Phaseolus vulgaris*] plants to absorb and translocate the antirust complex of a culture filtrate, F-17, containing *Streptomyces cinnamomeus* f. *azacoluta* [**36**, p. 339], was studied under greenhouse conditions and the effectiveness of unpurified and partially purified preparations of the complex as a therapeutant against bean rust (*U. phaseoli typica*) [*U. appendiculatus*] tested under field conditions. The data indicate that the antirust complex in crude F-17, when applied at 1,100 p.p.m. to upper surfaces of leaves at the time of inoculation or 1–4 days after, was absorbed and moved into that part of the leaf occupied by the fungus in sufficient amounts to prevent pustule and spore formation or greatly limit them. Stem treatment was less effective when applied 2 or more days after the leaves were inoculated. When the complex was applied in the soil at 160 lb./acre some time elapsed before the antirust penetration of the soil and absorption and upward translocation took place. The infectivity of mature spores produced on treated plants was not less than that of those from untreated plants, but the rate of maturation was reduced.

The complex was 10 times more effective when applied during rainy, cloudy weather than in sunny, dry weather. The partially purified filtrate was 10–20 times more effective than crude filtrate. Spray application in the field at 1,125 p.p.m., initially on young heavily rusted bean plants, and repeated again after rainfall on the 1st, 5th, & 12th day following, resulted in reduction of pustule formation by 75–100% below the number of pustules/leaf at the outset. Stored in dry air for 1 yr. at room temp. the crude solids maintained their potency.

Mosca (Anna M.). **Ricerche sulla micoflora del terreno di una valetta nivale nel Parco Nazionale del Gran Paradiso.** [Researches on the fungus flora of the soil of a snow valley in the Gran Paradiso National Park.]—*Allionia*, **3**, 2, pp. 83–107, 1 diag., 1 map, 1957. [English summary. 77 ref.]

From the soil of a snow valley in the Italian Alps (Aosta) at about 8,750 ft. only 37 spp. were isolated by the soil suspension method. They included *Beauveria bassiana*, *B. globulifera*, and an unusual insect parasite (*Synnematium* sp.). The fungal population is characteristic of a mycocoenosis (B. Peyronel, *Nuovo G. bot. ital.*, N.S., **26**, 1–2, pp. 379–383, 1955) [**37**, p. 579] of a high altitude or latitude (with abundance of Phycomycetes), in a cool, humid climate (few Aspergilli and a very low *Aspergillus*:*Penicillium* ratio), in a non-forest soil (low percentage of

'*Moniliaceae residuae*'), and with copious organic matter (a fair number of Ascomycetes, Tuberculariaceae, and Stilbaceae).

Peyronel (B.) & Dal Vesco (Giovanna). **Ricerche sulla micoflora di alcuni terreni agrari somali.** [Researches on the fungus flora of some cultivated soils in Somalia.]—*Allionia*, **3**, 2, pp. 113–132, 4 fig., 4 diag., 2 maps, 1957. [English and French summaries. 49 ref.]

Soil samples collected in 1952–3 by the late Dr. F. Sappa in the coastal area of southern Somalia, between Mogadishu and the mouth of the Juba river, were examined at the Centro di Studio per la Micologia del Terreno del Consiglio Nazionale delle Ricerche, Turin, by methods based mainly on those of Sappa [**37**, p. 579]. Of the 76 taxa isolated, 3 were Phycomycetes, 3 Ascomycetes, 2 Sphaeropsidales, 62 Moniliales, and 6 Mycelia Sterilia. The most numerous group (23 fungi) was *Aspergillus*, followed by *Penicillium* (18). The type of mycocoensis [see above] was intermediate between those of savannah and forest, but closer to savannah, as described by Sappa and Mosca [**35**, p. 718], being characteristic of arid regions in low latitudes.

Reddy (T. K. R.). **Rhizosphere microflora of Pteridophytes.**—*Curr. Sci.*, **28**, 3, pp. 113–114, 1 graph, 1959.

Study at the University of Madras of the rhizosphere of pteridophytes represented by members of the Equisetaceae, Cyatheaceae, and Polypodiaceae showed the fungal and bacterial numbers in the rhizosphere of 4 genera to be in the order of *Lastrea* > *Adiantum* > *Pteris* > *Equisetum*. There were a large number of *Aspergillus* spp. [cf. **33**, p. 626] and *Penicillium* spp., and frequent isolation of *Trichoderma* spp., which often overgrew the others; pathogenic *Fusarium* spp. were infrequent.

Papavizas (G. C.) & Davey (C. B.). **Isolation of Rhizoctonia solani Kuehn from naturally infested and artificially inoculated soils.**—*Plant Dis. Reptr*, **43**, 3, pp. 404–410, 1959.

In experiments by the U.S. Dept Agric. to find a substrate more suitable than maize kernels [cf. **36**, p. 615; **38**, p. 65] for isolation of *R.* [*Corticium*] *solani* [**37**, p. 145] from the soil, mature buckwheat stem pieces, 5–8 mm. long, buried for 4 days in naturally infested soil that had been planted 8 times with susceptible snap beans (*Phaseolus vulgaris*) (turned under at 3-week intervals, to increase the potential of *C. solani*), or in mixtures of varying proportions of infested and non-infested soil, or in soil inoculated with graded amounts of *C. solani* isolates, were readily colonized by this fungus. As an alternative Top Crop snap bean seedlings were grown in the same soils and isolations made from the hypocotyls after 3 weeks. Interference by actinomycetes and bacteria was eliminated when isolations of *C. solani* were made on water agar containing 50 p.p.m. each of aureomycin hydrochloride, neomycin sulphate, and streptomycin sulphate. The buckwheat gave more rapid results than the bean seedlings and provided a more reliable criterion of inoculum potential of *C. solani* in the soil.

Ward (E. W. B.) & Henry (A. W.). **Differential reaction of saprophytic and parasitic soil-inhabiting fungi to indoleacetic acid.**—*Nature, Lond.*, **183**, 4667, p. 1064, 1959.

The growth of 2 pathogenic soil-inhabiting fungi, *Ophiobolus graminis* and *Fomes annosus*, studied at the Dept of Plant Science, University of Alberta, Edmonton, was significantly inhibited by 10 and 1×10^{-5} M of indoleacetic acid [cf. **37**, p. 348], respectively and completely inhibited at higher concs., while neither *Trichoderma viride* nor *Trichocladium asperum*, 2 soil saprophytes, was inhibited by up to 100×10^{-5} M.

Herr (L. J.). **A method of assaying soils for numbers of actinomycetes antagonistic to fungal pathogens.**—*Phytopathology*, **49**, 5, pp. 270–273, 1 fig., 2 graphs, 1959.

A triple-agar-layer plate technique is described from the Ohio Agricultural Experiment Sta., Wooster, employed to assay antagonists of *Fusarium roseum*, *Rhizoctonia* [*Corticium*] *solani*, *Pythium ultimum*, and *Verticillium alboatrum*, but applicable to other fungi.

The 1st layer, 10 ml. 1·5% water agar, is put into the Petri dishes 1 day before the 2nd layer, which contains the soil suspension in 5 ml. 1% water agar. The soil dilution, starting with 1:10 in water, is continued to a final dilution in the water agar which varies with the pathogen and the soil; 1:20,000 was used in studies with the 1st 3 above-named in field soil and 1:100,000 with *V. alboatrum* in greenhouse soil. After incubation at 25° C. for 2 days the 3rd layer is added, 5 ml. of an equal vol. mixture of 2% Czapek agar and a macerated fungus suspension from 3-day-old cultures of the assay fungus grown at 25° on Czapek's sucrose-nitrate solution. After further incubation of the plates at 25° for 4 days (7 for *V. alboatrum*) the antagonists appearing are counted.

Statistical analysis of the method showed that 10 plate sets/soil sample were sufficient and that though the distribution of counts of antagonists was not normal this had little effect on analysis of variance of the data.

Lockwood (J. L.). **Streptomyces spp. as a cause of natural fungitoxicity in soils.** —*Phytopathology*, **49**, 6, pp. 327–331, 1959.

At Michigan State University, East Lansing, the toxic effects of natural soils, and of sterilized soils inoculated with mycolytic isolates of *Streptomyces* spp. [cf. **36**, p. 112], obtained by Carter and Lockwood's technique [**36**, p. 553], on the mycelium and conidial germination of 8 spp. of plant pathogenic fungi were studied. To determine lysis of mycelium, agar seeded with conidia and incubated 4 days was covered with soil which was washed off 7–20 days later and counts were made of the hyphae crossing the periphery of the field of a ×43 objective (usually 5 fields/plate), or pieces of the culture about 4 mm. sq. were crushed between 2 slides and observed under a ×10 objective, the lysis rating as compared with the untreated controls being estimated from 4 mounts. The inhibitory effect of soils on conidial germination was studied by 6 methods, involving either direct contact between soil and agar seeded with the conidia (least satisfactory) or germination of conidia on agar that had been in previous contact with soil, either directly or with cellophane or a supplementary layer of agar interspersed.

When Petri dishes with cultures of fungi on peptone agar were buried (without lids) 4 in. deep in soil for 14 days, or when either living cultures or cultures killed with propylene oxide were covered with unsterilized soil for 20 days in the laboratory, partial or complete lysis occurred, except of *Rhizoctonia* [*Corticium*] *solani* in the field and killed cultures of *Fusarium solani* f. *pisi* and *Verticillium alboatrum*. No such lysis occurred when the soil was sterilized with propylene oxide. Similar results were obtained with the more abundant growth on potato dextrose or Czapek agar.

Sterilized soils inoculated with mycolytic isolates of *Streptomyces* spp. and incubated for 14 days produced similar lytic effects on the test fungi, and the diffusible nature of the lytic substances was indicated by fungitoxic action taking place through cellophane and agar barriers. Inhibition of conidial germination by natural unsterilized soil and by inoculated soil was also demonstrated, though results varied and were sometimes inconsistent.

Nair (G. G. K.) & Mehta (B. V.). **Studies on zinc deficiency symptoms in some common crops of Gujarat (India).**—*J. agric. Sci.*, **52**, 3, pp. 396–401, 1959.

At the Institute of Agriculture, Anand (B.S.), sand cultures of tobacco var.

Kalkatia, eggplant var. Doli-5, and maize (all transplanted to the plots at 3 in.), guar (*Cyamopsis psoraloides*) raised from seed in the sand culture, and buddings of Mosambi orange on jambori stock were used.

In Zn deficient guar growth was depressed, small leaves were produced, there were few flower buds, and the leaves fell at flowering. In eggplant the most characteristic symptom was chlorosis, followed by necrosis and drying of the leaves: growth was stunted and the flowers did not set fruit. In maize intermittent light yellow bands developed parallel to the midrib. In tobacco chlorosis was followed by necrosis in the lower leaves, while growth was stunted and the leaves small. In mosambi typical deficiency symptoms were whitish yellow patches between the veins and small, pointed, and unhealthy leaves.

DINGLEY (JOAN M.). **New records of fungous diseases in New Zealand, 1957–58.**—*N.Z. J. agric. Res.*, **2**, 2, pp. 380–386, 4 fig., 1959.

New records included in this list [cf. **37**, p. 71] are *Graphiola phoenicis* on *Phoenix canariensis*, *Septoria passiflorae* on *Passiflora edulis*, *Colletotrichum graminicola* on *Bromus catharticus*, and the following new host records: *Albugo tragopogonis* on young cineraria, *Sphaerotheca fuliginea* on leaves of an ornamental gourd (*Cucurbita pepo*), and *Alternaria citri* on leaves of citronelle (*Citrus* sp.).

BRIEN (R. M.) & DINGLEY (JOAN M.). **Fourth supplement to 'A revised list of plant diseases recorded in New Zealand', 1957–1959.**—*N.Z. J. agric. Res.*, **2**, 2, pp. 406–413, 1959.

Included among the 95 diseases of 114 hosts listed in this supplement [cf. **37**, p. 71] are: *Fusarium semitectum* on beet; *F. conglutinans* on swede and turnip [map 54]; *Alternaria dianthicola* on carnation; *Phyllosticta eriobotryae* on loquat; *Ascochyta caricae* on fig; *F. bulbigenum* var. *batatas* and *Rhizopus stolonifer* on sweet potato; *Phytophthora megasperma* on pine [map 157]; and *Pleiochaeta setosa* on *Lupinus angustifolius* [map 243].

NEELY (D.). **New and unusual leaf disease fungi for Illinois.**—*Plant Dis. Reptr*, **43**, 4, pp. 498–499, 1959.

This report from the Illinois State Natural History Survey, Urbana, on 21 fungi recorded for the 1st time in the region, includes 4 spp. which are new records for the United States: *Coniothyrium pirinum* on *Crataegus mollis*, *Epicoccum purpurascens* [*E. nigrum*] on *Gingko biloba*, *Gloeosporium* sp. on *Cotinus coggygria*, and *Pestalotia guepini* on *Cercis canadensis*.

CUMMINS (G. B.). **Observations of the life cycles of some west American rust fungi.**—*Plant Dis. Reptr*, **43**, 3, pp. 411–412, 1959.

In this report from Purdue University Agricultural Experiment Station, Lafayette, Indiana, on a study in Montana, Colorado, and Arizona in 1955–57, 4 examples are given in detail of alternate host relationships, checked by observations and in some cases by greenhouse inoculations, and the life cycles of 23 rust spp. with their various telial and aecidial hosts are tabulated.

JØRSTAD (I.). **Uredinales of the Canary Islands.**—*Skr. norske VidenskAkad.*, I, *1958*, 2, 182 pp., 1 map, 1958.

This account, based on material collected in 1954 and 1957, enumerates 82 spp. in alphabetical order and a discussion is followed by notes on life histories, relative distribution, and comparisons with other rust floras. A host index is appended.

GAMALITSKAYA (Mme N. A.). Новые для флоры Киргизии виды ржавчинных грибов. [Species of rust fungi new for the flora of Kirgizia.]—О ржавчинных

грибах бассейна реки Чон-Кемин. [On the rust fungi of the Chon-Kemin river basin.]—Труд. Инст. Бот., Акад. Наук Киргиз. ССР [*Trud. Inst. Bot., Kirgiz Acad. Sci.*], *1958*, 3, pp. 91–97, 11 fig.; 4, pp. 119–133, 1958.

Mycological expeditions in 1953–56 to the Frunze region of Kirgizia yielded 154 spp. of rusts on 208 host plant spp., including 2 new spp.; 49 spp. were new records for Kirgizia. Of these, 11 are described in the first paper and 39 listed in the second.

Rayss (T[scharna]) & Chabelska (C.). **Quelques précisions sur les Urédinées hétéroxènes de Palestine.** [Notes on the heteroxenous Uredinales of Palestine.] —*Uredineana*, **5** (*Encycl. mycol.*, **31**, *1958*), pp. 5–9, 1959. [10 ref.]

The results are given of several years' study of heteroecious rusts of which the aecidial state is found in Palestine. Mention may be made of the following. With aecidiospores collected on *Anchusa strigosa* severe infection of *Aegilops variabilis* (*Puccinia aegilopis*, uredo and teleuto) was obtained. Aecidia from *Rhamnus palaestina* gave uredo- and teleutospores of *P. coronata* on *Avena barbata* and *Phalaris minor*. From aecidiospores found on *Anemone coronaria* the uredo- and teleutospores of *Tranzschelia pruni-spinosae* f. *discolor* were obtained. Near *Ranunculus asiaticus* severely attacked by *Aecidium ranunculacearum* the authors found young *Poa hackelii* (*P. seria-bulbosa*) plants heavily infected by *Uromyces poae*. Evidence was obtained that the last-named fungus had 2 hosts (*R. asiaticus* and *P. hackelii*) and was a distinct form, *U. poae* f. sp. *asiatici-hackeli* Rayss & Chabelska.

Buhr (H.). **Rostpilze aus Mecklenburg und anderen Gebieten.** [Rust fungi from Mecklenburg and other districts.]—*Uredineana*, **5** (*Encycl. mycol.*, **31**, *1958*), pp. 11–136, 1959. [25 ref.]

A list of rust fungi recorded in Mecklenburg and certain other regions of Germany and Denmark, arranged under alphabetical order of the host plants. For each fungus there are notes on, *inter alia*, where it occurs and its frequency.

Viennot-Bourgin (G.). **Urédinales d'Afrique (5e note). Urédinales de Côte d'Ivoire (4e note).** [Uredinales of Africa (5th note). Uredinales of the Ivory Coast (4th note).]—*Uredineana*, **5** (*Encycl. mycol.*, **31**, *1958*), pp. 137–248, 66 fig., 1959.

This further contribution [cf. **35**, p. 330] contains (in addition to numerous very useful figures) descriptive notes on and Latin diagnoses for 13 new species of Uredinales. Mention may be made of the following items: *Phakopsora desmium* on *Gossypium aridum* and *G. barbadense*, *Puccinia polysora* [map 237] on maize, and *Uromyces dolichi* on pigeon pea.

Mayor (E.). **Étude expérimentale de quelques Urédinées hétéroïques.** [An experimental study of some heterœcious Uredinales.]—*Uredineana*, **5** (*Encycl. mycol.*, **31**, *1958*), pp. 263–286, 1959. [14 ref.]

Fully tabulated results are given of the author's experiments (greenhouse inoculations) on the host ranges of some rusts including *Melampsora allii-fragilis*, *M. allii-salicis-albae*, *Puccinia allii-phalaridis*, *P. symphyti-bromorum*, and *P. alternans* f. sp. *bromi-erecti*.

Guyot (A. L.). **Contribution à l'étude des Urédinées parasites de la flore tunisienne. 2.** [A contribution to the study of the parasitic Uredinales of the Tunisian flora.]—*Uredineana*, **5** (*Encycl. mycol.*, **31**, *1958*), pp. 353–383, 13 fig., 1959.

This paper continues the author's notes on Tunisian rusts [cf. **33**, p. 383] and is based on collections made during a stay in Tunisia in Sept.–Oct., 1953. Mention

may be made of the following records: *Puccinia antirrhini* on *Antirrhinum majus* (1st report from Tunisia [map 40]), *P. coronata* on *Avena sterilis* (1st report from Tunisia) and on *Festuca arundinacea* (host new for N. Africa), *P. cynodontis* on *Cynodon dactylon*, *P. malvacearum* on hollyhock, and *Uromyces setariae-italicae* on *Setaria verticillata*.

Guyot (A. L.) & Chevassut (G.). **De quelques Urédinées d'Algérie.** [On certain Uredinales of Algeria.]—*Uredineana*, **5** (*Encycl. mycol.*, **31**, *1958*), pp. 385–400, 3 fig., 1959.

Notes, descriptive and technical, are given on a number of Uredinales collected in Algeria during a 2-yr. period. Mention may be made of *Puccinia allii* on *Allium chamaemoly*, *P. antirrhini* on *Antirrhinum majus* [map 40], *P. cichorii* on chicory and *Lactuca scariola*, *P. coronata* on *Avena alba* and *A. sterilis*, *P. graminis* on *Agropyrum* [*Agropyron*] *repens*, *P. hordei* on *Hordeum murinum*, and *P. poae-nemoralis* (new host for N. Africa) on *Poa annua*.

Joshi (L. M.) & Reddy (A. R.). **Taxonomic studies on Uromyces on Indigofera species in India.**—*Indian Phytopath.*, **11**, 1, pp. 59–61, 1958.

U. indigoferae on *I. tinctoria* from Bapatla (Andhra State) and the type on *I. mexicana* differed very little from the type specimen of *U. orientalis* [cf. **25**, p. 322] on *I. linifolia* and from other collections on *I. cordifolia* and *I. glandulosa*; the authors consider that all are properly referred to *U. indigoferae*.

Ignatavičiūtė (M.). **Nauji Lietuvos TSR florai kuliniai grybai.** [Smut fungi new for the flora of the Lithuanian S.S.R.]—*Darb. biol. Inst., Vilnius*, **3**, pp. 339–353, 1958. [Russian summary.]

Included in this annotated list from the Biological Institute, Vilnius, of 39 spp. of Ustilaginales are *Ustilago zeae* [*U. maydis*] on maize [map 93], *U. crameri* [239] on *Setaria italica*, and *Sphacelotheca sorghi* [220] on sorghum; 27 are first occurrences for Lithuania. Some of the specimens were in the Herbarium of the Vilnius State University, others were collected during summer 1956–7.

Frauenstein (Kate). **Falsche Mehltaupilze.** [Downy mildew fungi.]—46 pp., 21 fig., Wittenberg Lutherstadt, A. Ziemsen Verlag, 1959. DM. 3.75.

A popular account of the group (Peronosporaceae and *Phytophthora*), covering systematics, disease symptoms, morphology and life cycle, and control, illustrated by brief accounts of important representatives of the genera and the diseases they cause.

Batra (L. R.) & Korf (R. P.). **The species of Ciborinia pathogenic to herbaceous angiosperms.**—*Amer. J. Bot.*, **46**, 6, pp. 441–450, 26 fig., 1959.

On the basis of anatomical studies at the Dept of Plant Pathology, Cornell University, 2 distinct spp. were recognized on *Erythronium*. *C. erythronii* (*Sclerotinia erythronii*) on *E. albidum* and *F. americanum* develops its sclerotia in nearly all parts of the plant, overwinters also as mycelium in bulbs, and forms spermatia in the field. Prolonged washing of sclerotia proved to be an important factor for development of apothecia. *C. gracilis* (*S. gracilis*) on *E. albidum* is described. Two new spp., *C. trillii* Batra & Korf, pathogenic to *Trillium decumbens*, *T. grandiflorum*, and *T. maculatum*, and *C. violae*, pathogenic to *Viola papilionacea*, *V. pubescens*, and *V. rotundifolia*, are described.

The authors hold that *Ciborinia* must be distinguished from *Sclerotinia*. The discoid sclerotium which develops within the host tissues, digesting these wholly or partially, appears to be a structure closely allied to the substratal stroma of *Rutstroemia* and of *Lambertella*, rather than to the tuberoid sclerotium developing

free upon the mycelium in such genera as *Sclerotinia*, *Botryotinia*, and *Streptotinia*. The generic diagnosis is emended.

A new combination, *C. hirtella*, is also proposed for *S. hirtella*, the sclerotia of which are formed in the bark of small branchlets [of *Castanea*].

Bakshi (B. K.) & Singh (B.). **The Indian species of Merulius.**—*Indian Phytopath.*, **11**, 1, pp. 70–75, 4 fig., 1958.

Descriptive and technical notes are given on 4 species, including *M. aureus* [cf. **5**, p. 588] causing a brown, cuboidal rot in the wood of logs of *Picea morinda*, *Pinus excelsa*, and deodar in the W. Himalayas; *M. confluens* [cf. **26**, p. 517] on dying branches of cultivated rose, *Shorea robusta*, and *Castanea sativa* at Dehra Dun and on *Quercus semicarpifolia* at Chakrata, U.P.; and *M. tremellosus* [**34**, p. 619], very common, mostly on oaks, on which, in W. Himalayas, it is associated with a white pocket rot; it is also found on *Betula alnoides* and deodar.

Cosslett (V. E.). **Microscopy with X-rays.**—*Nature, Lond.*, **183**, 4673, pp. 1423–1427, 1 fig., 1 graph, 1959.

This review deals with the subject under the headings of reflection focusing, contact microradiography, projection microradiography, microanalysis by differential adsorption, and emission microanalysis. The use of the techniques involved as they relate to biology is indicated.

Schirmer (H.) & Gsur (H.). **Kleine Beiträge zur mikrobiologischen Methodik.** [Brief contributions to microbiological methods.]—*Sydowia*, **12** (*1958*), 1–6, pp. 492–495, 1959.

From the I. medizin Universitätsklinik, and the I. chem. Universitätsinstitut, Vienna, the authors describe a simple method for the quantitative and qualitative assessment of micro-organisms or gases developing in the course of biochemical processes, using pipettes in place of the fermentation tube; a process for assessing the antibiotic content of unsterilized milk; the use of 'Kelomat' or other steam pressure containers as autoclaves in the laboratory; a simple pinch-clip device fitted to pipettes to facilitate filling and emptying; and a new plate method to assess the penicillin conc. in 0·01 ml. of blood taken from new-born babies.

Feder (W. A.) & Duddington (C. L.). **Freeze-drying of Harposporium anguillulae Lohde in its nematode host.**—*Nature, Lond.*, **183**, 4663, pp. 767–768, 1959.

The freeze-drying of fungus mycelium was attempted on endozoic *H. anguillulae* recovered from sandy soil of a citrus grove in Florida infested with the burrowing nematode *Radopholus similis*. The fungus was carried by living nematodes of the genera *Rhabditis* and *Panagrellus* growing on corn meal agar, and it easily infested other disease-free nematodes kept either on corn meal agar plates or swimming in tubes of sterile distilled water: infection became apparent after 3–5 weeks at 22° C. Both types of cultures were freeze-dried. The agar with infected nematodes was placed in a Waring blender in some distilled water, homogenised for 1 min., frozen in drying flasks, and dried for 8–10 hr. giving a fluffy powder which contained dead but intact nematodes, fungal mycelium, and spores. When the powder was placed in cultures containing fungus-free nematodes infection developed normally: to date the *H.* powder has remained virulent and active for periods up to 4 months after drying.

Roland (G.). **Rapport sur l'activité de la Commission de Nomenclature des Virus, 1954–1959.** [Report on the activity of the Commission on the Nomenclature of Viruses, 1954–1959.]—*Taxon*, **8**, 4, pp. 126–130, 1959.

From replies to a questionnaire sent out in Nov. 1954 to members of a special International Commission of Virologists to elucidate questions of virus nomenclature

formed by the author at the request of the Nomenclature Section of the Eighth International Botanical Congress [**37**, p. 440], it was evident that a majority favoured the adoption of a Latin nomenclature for virus diseases of higher plants. In Jan. 1958 a list of Latin names which had been drawn up was sent to 52 virus laboratories in 19 countries and the recipients were asked whether they would be willing to use the names suggested. Eighteen replies were received, of which only 5 were opposed to the new system. A list of 171 Latin names proposed by the Commission with the corresponding names used in the Supplement to *R.A.M.*, **35**, was accordingly presented to the Congress and is reproduced. Each binomial comprises a generic name, formed by adding the suffiix *-virus* to the generic name of a host plant, and a specific epithet, e.g. *Nicotianavirus maculans*, tobacco mosaic virus.

KAVANAGH (T.). **Virus diseases of crucifers in Ireland.**—*J. Dep. Agric. Eire*, **54** (*1957–58*), pp. 157–168, 4 pl. (7 fig.), [1959. 22 ref.]

The author presents the results of the first detailed study of virus diseases of crucifers in Eire. The 1st part of the paper describes field studies on such diseases affecting farm, market-garden, and ornamental crucifers, with recommendations for their control in the light of local practices; the 2nd part deals with greenhouse studies made to establish by sap inoculation tests the presence in Ireland of one or more crucifer viruses. The segregation of these viruses into turnip virus 1 [mosaic virus] group and cauliflower virus 1[mosaic virus] group [**33**, p. 398] is accepted and the presence of both was established. The former causes mottling and can affect families other than the Cruciferae, while the latter induces vein-clearing and affects only the Cruciferae.

Swedes are the principal farm crucifer but virus infection of farm brassicas presents no problem. Surveys of broccoli plantations in Rush, County Dublin, revealed that while most holdings had a max. infection of 1 or 2%, infection rates of 15 and 25% could be found, and at Albert College, Glasnevin, 12, 22, and 23% infection occurred in different years. While infection rates of 1 or 2% are not in themselves serious they constitute a dangerous nucleus.

Two viruses of ornamental crucifers were investigated, both of which caused flower-breaking. One, affecting Brompton stock (*Matthiola incana*) probably belonged to the turnip mosaic virus group, while the other, affecting wallflower, was probably an allied strain of the same group.

SCHWARZ (R.). **Epidemiologische Untersuchungen über einige Viren der Unkraut- und Ruderalflora Berlins.** [Epidemiological studies on some viruses of weeds and ruderal plants in Berlin.]—*Phytopath. Z.*, **35**, 3, pp. 238–270, 8 fig., 2 diag., 6 graphs, 1959. [46 ref. English summary.]

In 1956–7 plants on waste land, cultivated fields, and the Botanical Gardens in Berlin, tested at the Institut für gärtnerische Virusforschung, Berlin-Dahlem, yielded the viruses of cucumber mosaic (CMV) [**36**, p. 749], cabbage black ring spot (BRS) [**36**, p. 506], tobacco ring spot [**36**, p. 356], and a new virus named *Stellaria*-Bandblättrigkeit [**38**, p. 503]. Of 69 weeds and waste land plants 30 spp. proved potential hosts of CMV, 33 of BRS str., and 18 of tobacco 'mauche' virus [**37**, p. 402].

The best aphid transmission of CMV was obtained from *Lactuca serriola* (by *Myzodes* [*Myzus*] *persicae* and *Hyperomyzus lactucae*), *Capsella bursa-pastoris* (by *Brevicoryne brassicae* and *M. persicae*), and *Solanum nigrum* (by *M. persicae*). Aphid transmission of BRS str. was not possible except from Cruciferae (*Alliaria officinalis*, *C. bursa-pastoris*, *Sinapis arvensis* and *Sisymbrium loeselii*); best transmission was obtained with *B. brassicae*, *Lipaphis erysimi*, *L. frizmülleri*, and *M. persicae*.

A new method of determining the proportion of virus vectors among the alatae was to expose groups of plants in different places for 2 weeks each and test for infection. A 40% increased attraction was achieved by placing yellow painted plates of fibre board under the trap plants, the alatae being trapped by sticky glue on the plants.

Groups of plants with such plates, consisting of 3 tobacco, 1 *Matthiola incana*, and 2 *Chenopodium quinoa*, exposed during the aphid flight for 2 weeks in 3 different places in 1956 and 1957 yielded [potato] virus Y and its tobacco veinal necrosis strain, CMV, BRS (local lesions str.), and lucerne mosaic virus (all from Samsun tobacco), BRS and CMV from *M. incana*, and lucerne mosaic virus from *C. quinoa*.

There were obvious relations between the occurrence of the viruses on the trap plants and aphid flight. Virus Y and its tobacco veinal necrosis str. were isolated frequently in both yr. from plants with attraction plates in the immediate neighbourhood of potato crops. The ratio of the occurrence of virus Y to its str. was 10:1. The highest percentage of viruliferous aphids was found after the climax of the aphid flight. Infection of up to 95% of plants with attraction plates (tobacco) within 2 weeks with CMV was found in 2 places in 1956, but in 1957 only a low rate of infection occurred. The max. BRS infection (on *M. incana* and tobacco) could be definitely related to the flight of the main vector, the late max. of infection being directly linked with the late flight of *B. brassicae*. The earlier max. on the waste land was the result of the earlier flight of the main vectors, *L. erysimi* and *L. fritzmülleri*, in this area.

Schwarz (R.). **Neue Uberträger für eine Variante des Wasser- und Kohlrübenmosaik-Virus und für das Gurkenmosaik-Virus.** [New vectors for a variant of the Turnip and Swede mosaic virus and for the Cucumber mosaic virus.]—*Z. PflKrankh.*, **66**, 2, pp. 89–90, 1959.

At the Institut für Gärtnerische Virusforschung, Berlin-Dahlem, and the Institut für Pflanzenkrankheiten der Landwirtschaftlichen Hochschule, Hohenheim, a variant of the turnip and swede mosaic virus [turnip mosaic virus] was transmitted experimentally by the aphid *Lipaphis fritzmülleri*, which is monophagus on *Sisymbrium loeselii*. It seems likely that the infection of *S. loeselii* on bombed sites in Berlin may be attributable to this vector and the virus may be transmitted from these plants to ornamentals of the Cruciferae, or even to a wider range of plants.

Cucumber mosaic virus was also fairly successfully transmitted to *Lactuca serriola* by *Hyperomyzus lactucae*, monophagus on *Sonchus* sp. The epidemiological importance of the vector is slight as economic plants are only occasional hosts.

Heinze (K.). **Neue Gelegenheitsüberträger für das Gurkenmosaik-Virus (Marmor cucumeris), das Y-Virus der Kartoffel (Marmor upsilon), die Tomatenstauche (dwarfing of Tomato) und ein neuer Uberträger für die Vergilbungskrankheit der Rübe (Corium betae).** [New occasional vectors for Cucumber mosaic virus, Potato virus Y, and dwarfing of Tomato, and a new vector for Beet yellows virus.]—*Z. Naturf.*, **14 b**, 6, pp. 414–415, 1959.

The following results were obtained in experiments at the Institut für Gärtnerische Virusforschung, Berlin-Dahlem, using aphids that had previously been starved for 2–4 hr. and then allowed to feed for 5–10 min. on infected material. Cucumber mosaic virus was transmitted to all of 10 plants by *Dactynotus erigeronensis*, to 7 of 10 by *D. jaceae*, to 2 of 2 by *Myzella galeopsidis*, to 3 of 10 by *Myzodes auctus*, to all of 10 by *Toxopterina plantaginis*, to 1 of 10 by *Cerosipha verbasci*, to 2 of 10 by *C. serpylli*, to 8 of 10 by *C. confusa*, and to 1 of 5 by *C. affinis*.

M. auctus transmitted potato virus Y to 5 of 10 plants, while dwarfing of tomato was carried to 7 of 24 by *C. gossypii* and 1 of 10 each by *Rhopalomyzus ascalonicus* and *Metopolophium occidentalis*.

The new vector of beet yellows virus was *Myzus portulacea,* which transmitted infection to 16 of 30 plants.

Valenta (V.). **Interference studies with yellows-type plant viruses. I. Cross protection tests with European viruses.**—*Acta virol.*, **3**, 2, pp. 65–72, 1959.

At the Institute of Virology, Czechoslovak Academy of Sciences, Bratislava, previous infection with Czechoslovak or German strains of potato witches' broom virus (WB–Čs II/Čs 1/55 and WB–DBR/B) failed to protect tobacco against mild or severe strains of [tomato] stolbur virus [**38**, p. 616], the WB symptoms being entirely suppressed. Symptoms of the Čs 1/55 strain were also suppressed by the Crimean yellows (CY) virus [loc. cit.], but not those of WB–DBR/B. Mixed infections were obtained with either of the Czechoslovak types I, II, or III of WB and the German type but there was a peculiar interference leading to a temporary masking of symptoms of II and III after challenging inoculation with the German virus.

Amici (Adriana). **Prove preliminari di confronto sulla sintomatologia di piante virusate mantenute, dopo l'infezione, a luce artificiale e naturale.** [Preliminary comparative tests on the symptomatology of virus-diseased plants maintained after infection under artificial and natural light.]—*Ric. sci.*, **29**, 5, pp. 991–997, 1959. [French, English, and German summaries.]

At the Istituto di Patologia Vegetale, University of Milan, the author studied the tobacco, cucumber, and turnip yellow mosaic viruses and compared the symptoms of the 1st 2 on plants maintained under artificial (fluorescent 12 hr./day) or natural light after inoculation. The plants used in the tobacco mosaic series were *Chenopodium amaranticolor*, *Datura stramonium*, tomato, *Lycopersicon pimpinellifolium*, *Nicotiana glutinosa*, tobacco vars. American Burley and Samsun, *Petunia hybrida*, and *P.* sp. Cucumber mosaic virus was inoculated into chilli (*Capsicum annuum*), *Chenopodium amaranticolor*, cucumber, tomato, *N. glutinosa*, American Burley tobacco, Samsun tobacco, and *P.* sp.

In general, the symptoms were identical on plants kept under both forms of light, but tomatoes inoculated with tobacco mosaic virus developed golden-yellow areas on the leaves under artificial light at a late stage, while a kind of network of whitish spots spread over chilli leaves inoculated with cucumber mosaic and kept under natural light, sometimes accompanied by foliar malformations and shortened internodes. After 22–30 days young leaves of cowpeas developed bright yellow areas, sometimes extending over the entire surface, alternating with normal growth; after 60 days the chlorosis disappeared and was replaced by a light and dark mosaic. The plants were greatly reduced in size with much shortened and swollen internodes. These features agree in part with Price's description of the effects of the y[ellow] str. of cucumber mosaic virus [**14**, p. 5].

The incidence of infection tended to be higher in the series of plants kept under natural light.

Turnip yellow mosaic virus infected 93·5% of the 31 Chinese cabbage and 55·5% of the 9 cabbage inoculated. The symptoms on the former agreed with those already reported. On the latter, not specifically cited by Smith as a host [**36**, p. 303], pale green, raised spots with ill-defined margins appeared a fortnight after inoculation on the interveinal areas of the younger leaves and subsequently increased in numbers but not in size; later, grey, necrotic crusts were formed all over the older leaves, which withered completely. The young plants (40 days old at inoculation) died 40 days thereafter. All the plants in this series of tests were kept under artificial light.

When the 2 tobacco vars. were successively inoculated with tobacco and cucumber mosaic and exposed to artificial light, there was a delay of some days in the

appearance of the symptoms and a slight reduction in the incidence of infection of the latter virus as compared with the controls inoculated with 1 only.

Annual Report of the Department of Agriculture, Western Region of Nigeria, 1953–54.—xi+49 pp., 1959. 9*d*.

In the section of this report dealing with cacao (pp. 34–38) [cf. **37**, p. 203] a brief account is given of work against swollen shoot virus disease and black pod [*Phytophthora palmivora*], based on information already noticed [cf. **37**, p. 464 *et passim*].

Müntzing (A.). **Results of field trials with Cacao at hacienda Clementina, Ecuador.**—*Acta agric. scand.*, **9**, 2, pp. 129–148, 1959.

In tests (reported from the University of Lund, Sweden) during 1954–56 in a severely infested area of 32 ICS clones and 18 others, chiefly derived from local selections and from the Upper Amazon, the ICS clones were on the whole less resistant to witches' broom (*Marasmius perniciosus*) [**37**, p. 220] of the floral and vegetative parts than the Clementina clones, but the resistance of ICS 80, 89, 32, and 100 was excellent, in contrast to ICS 49, 91, 47, 39, 78, and 43, which were very poor. The best were the Upper Amazon SCA 6, SCA 12, and P 12A.

Different degrees of general pod infection, chiefly witches' broom but also other diseases such as *Monilia* pod rot [*M. roreri*: loc. cit.] and *Phytophthora* [*palmivora*: **37**, p. 652], are characteristic of different clones. This was established in 2 trials, the data from the resistance trial showing positive correlation with the yield trial. Pod resistance was usually better in the Clementina clones than in the ICS, probably as a result of successful selection for disease resistance as well as a better adaptation to local climate and environment. SCA 6 and SCA 12, with excellent resistance to fan and cushion brooms, also had fairly good pod resistance; P 12A was poor. The degree of pod infection may be very different in different years. Clones with a good pod production have, on the av., healthier pods than those with a low number.

The author concludes that pod resistance is largely independent of resistance to floral and vegetative witches' broom. Disease avoidance rather than resistance of the pods was demonstrated to occur among the ICS clones, though specific pod resistance does also occur in these.

Dudman (W. F.) & Nichols (R.). **Absence of gibberellin-like substances in filtrates of Marasmius perniciosus Stahel (Witch broom disease of Cacao).**—*Nature, Lond.*, **183**, 4665, pp. 899–900, 1959.

A more detailed account of information already noticed [**38**, p. 294].

Geshele (É. É.). Болезни зерновых культур в Сибири. [Diseases of cereals in Siberia.]—128 pp., 27 fig., 3 graphs, Sel'khozgiz, Moscow, 1956. Roubles 1.70. [Received June 1959.]

This book, the first of its kind, is intended for agriculturalists, and technical officers concerned with plant protection in Siberia, N. Kazakhstan, and the Siberian Trans Ural. On pp. 7–25 the characteristics of these regions are described, together with details of physiological disorders and mechanical injuries responsible for losses in yield. In the chapters on parasitic diseases (pp. 29–95) the author emphasises the importance of intensive control, especially of the smuts and bacterial diseases which are the main cause of loss in these areas; the fungal, bacterial, and virus diseases are described, together with measures for their control and for quarantine. The last chapter (pp. 96–123) includes recommendations for control measures and the improvement of present practices.

Leijerstam (B.). **Sjukdomar på stråsäd i Mellansverige 1958.** [Cereal diseases in central Sweden in 1958.]—*Växtskyddsnotiser, Stockh.*, **22**, 4, pp. 60–62, 2 fig., 1959.

Barley sustained particularly heavy damage from loose smut [*Ustilago nuda*] in some localities.

Black and crown rusts of oats [*Puccinia graminis* and *P. coronata*] caused very heavy damage. In a number of places the latter was observed to be spreading from *Rhamnus cathartica*.

A wide extension of *Septoria nodorum* on wheat was favoured by the rainy summer.

In general, the most virulent pathogens on all cereals were *Fusarium* spp.

Bruehl (G. W.), McKinney (H. H.), & Toko (H. V.). **Cereal yellow dwarf as an economic factor in small grain production in Washington, 1955–1958.**—*Plant Dis. Reptr*, **43**, 4, pp. 471–474, 1959.

Barley yellow dwarf virus [**37**, p. 768], widespread in Washington W. of the Cascade Mts. in 3 of these 4 yr., causes an estimated annual loss of $1,000,000 or more. An abnormal Nov. frost in 1955, however, eliminated the disease the following year. Eastwards the climate is less favourable to aphids unless, as in 1957–8, a mild winter is followed by a cool, wet spring. Winter climate thus strongly influences the occurrence of the disease.

Toko (H. V.) & Bruehl (G. W.). **Some host and vector relationships of strains of the Barley yellow-dwarf virus.**—*Phytopathology*, **49**, 6, pp. 343–347, 1959. [16 ref.]

The differential transmission of barley yellow dwarf virus by *Macrosiphum granarium* [*M. avenae*] and *Rhopalosiphum fitchii* [**37**, p. 768] led to a study at Washington State College, Pullman, of 34 field collections of the virus, of which 32 were transmissible by both vectors, the AG strain only by *R. fitchii*, and EG only by *M. avenae*. Both vector-specific strains produced symptoms typical of barley yellow dwarf on oats, wheat, and barley, but in oats and barley dwarfing and suppression of tillering were more severe with AG. In cross protection tests no interference was observed between the 2 strains, both of which were subsequently recoverable by their respective vector, but when simultaneous inoculation was carried out the symptoms of the more virulent AG strain were dominant. The acquisition and inoculation feeding periods were the same for both strains, 24 hr. and 4–8 hr., respectively, being required for satisfactory infection, which increased with an increase of either of these feeding periods. All nymphal instars and adults of both aphids are effective vectors.

Ponchet (J.). **La maladie du piétin-verse des céréales : Cercosporella herpotrichoides Fron. Importance agronomique, biologie, épiphytologie.** [Eyespot of cereals: *C. herpotrichoides*. Agronomic importance, biology, epiphytology.]—*Ann. Épiphyt.*, **10**, 1, pp. 45–98, 18 fig., 1959. [40 ref.]

A full account is given of a study of eyespot of cereals (*C. herpotrichoides*) [**35**, p. 417] by the author at the Station Centrale de Pathologie Végétale, Versailles, since 1951 with the technical help of R. Lorne, 1953–56, and B. Teilhard de Chardin, 1956–58. The paper deals *inter alia* with the geographical distribution of the disease, its agronomic importance (effects on factors affecting yield, effect on the yield of a planting, and the 'threshold of injuriousness'), sources of inoculum (crop debris, wild grasses), spread of the fungus (importance and manner of dissemination of the conidia, observations on disseminations occurring over long periods), development of the disease (the part played by temp., formation of the

lesions, determination of symptoms, considerations on experimentally induced epidemics), and forecasting epidemics.

The disease is of importance in France only in certain years. It may affect all 3 main factors upon which the yield of wheat depends, viz. the number of stalks, the number of grains/ear, and the average wt. of the grain; exceptionally, it may destroy the young tillers. The disease becomes important only when 20–25% of the stalks are seriously infected at harvest: this constitutes the 'threshold of injuriousness' and seasons in which it is likely to be exceeded and fungicidal treatment is desirable should be forecast from biological and meteorological data.

The inoculum causing primary attacks is provided by harvest debris (wheat, barley, or oats), new shoots springing up after harvesting, and wild grasses [cf. **16**, p. 242]; it becomes available as autumn begins and during damp winters. Dissemination of the conidia is by raindrops and wind. Once the fungus is present on the host development is as a function of temperature, provided humidity is adequate. It is on the precocity and duration of the different stages of development of the fungus that the gravity of an annual epidemic depends. The disease is not dangerous to spring sowings [cf. **12**, p. 560].

Jamalainen (E. A.). **Experiments on the use of some chloronitrobenzene and organic mercury compounds for the control of low-temperature parasitic fungi on winter cereals.**—*Maataloust. Aikakausk.*, **30**, pp. 251–263, 1 fig., 1958. [Finnish summary.]

At the Agricultural Research Centre, Tikkurila, 1955–58, *Fusarium nivale* [*Calonectria nivalis*: **36**, p. 692] was the main cause of damage to rye during overwintering and *C. nivalis*, *Typhula itoana*, and *T. idahoensis* [**37**, p. 363] to winter wheat. PCNB (pentachloronitrobenzene), PMA (phenyl mercury acetate), and PMS (phenyl mercury salicylate) compounds were effective against both types of mould when applied to seedlings in Nov. under weather conditions normal for S. Finland. With heavy infection in 1955–6 and 1957–8 increases in yield of rye (7 tests) were 12–122%, wheat (4 tests) 31–735%, and barley (1 test, against *C. nivalis*) 124%, Oct. treatments were less effective. In most experiments the PCNB dusts (avicol, botrilex, and brassicol) were applied at 5 kg. active ingredient/ha.; these were less effective than the 2 PMA preparations, Bayer 4426 dust used at 125 and verdasan dust or spray at 425 kg., in which the corresponding amounts of Hg were 75 and 212·5 g./ha., and the PMS sprays mercadmine (235 g.) and merculine (470 g.) with 110·5 and 221 g. Hg/ha. In a seed dressing experiment on winter rye fernasan 75 at 2 g./kg. reduced seedling infection by *C. nivalis* from 50% (untreated) to 20% and the organo-mercurial täyssato (2 g.) to 10%.

Watson (Marion A.) & Sinha (R. C.). **Studies on the transmission of European Wheat striate mosaic virus by Delphacodes pellucida Fabricius.**—*Virology*, **8**, 2, pp. 139–163, 4 fig., 1959.

At Rothamsted Experimental Station races of *D. pellucida* were isolated which transmitted wheat striate mosaic virus with different degrees of efficiency [**38**, p. 651]. The length of the incubation period of the virus in the vectors was found to increase as the proportion of planthoppers that were able to transmit infection decreased. Congenitally infective inbred lines did not become more infective after feeding on infected plants, but those which did not 'inherit' the virus could usually acquire it with about the same efficiency as that of the parent race. Females of an efficient race which became infective as a result of feeding on infected plants as nymphs, 15 days before mating, transmitted the virus to eggs laid 10–15 days after mating, but others fed on infected plants only during mating usually did not so transmit, though they were able to infect plants within 15 days of acquiring virus. Infective females fed on infected plants as nymphs had 40% fewer progeny than

those fed on healthy plants. Some embryos died in the egg, and it is probable that the virus was pathogenic to them. The poor reproductive ability of infective females tends to eliminate the virus from colonies that are unable to renew their infectivity by feeding on infected plants.

Sill (W. H.) & Del Rosario (Maria S.). **Transmission of Wheat streak mosaic virus to Corn by the Eriophyid mite, Aceria tulipae.**—*Phytopathology*, **49**, 6, p. 396, 1959.

At the Kansas Agricultural Experiment Station, Manhattan, a str. (white mottle) of the virus [**37**, p. 82] was transmitted by *A. tulipae* from maize to wheat, and back. Maize, though not seriously affected by the virus [cf. **37**, p. 40], thus forms an over-summering reservoir for both virus and vector, though the latter, being small, is rarely found.

Sreekantiah (K. R.) & Joshi (L. M.). **A Trichothecium sp. (Cephalothecium sp.) as a hyper-parasite on Puccinia graminis tritici (Pers.) Erikss. & Henn.**—*Indian Phytopath.*, **11**, 1, pp. 62–65, 1 fig., 1958.

For 2 successive years *T. roseum* and an unidentified fungus were isolated from uredosori of black rust (*P. graminis* f. *tritici*) [cf. **27**, p. 560] on wheat in Delhi. Fluffy fungal growth appeared 5–7 days after wheat leaves bearing well developed uredosori were sprayed with spore suspension of *T. roseum*. When mixed with spores of *T. roseum* uredospores failed to germinate, in contrast to 100% germination in the control. No infection was obtained when wheat seedlings were inoculated with a mixture of spores and uredospores. Tests indicated that *T. roseum* produces certain metabolic products which inhibit the germination of uredospores of *P. graminis*.

Knott (D. R.). **The inheritance of rust resistance. IV. Monosomic analysis of rust resistance and some other characters in six varieties of Wheat including Gabo and Kenya Farmer.**—*Canad. J. Pl. Sci.*, **39**, 2, pp. 215–228, 1959.

This further contribution [cf. **37**, p. 272] deals with studies to determine the chromosomes carrying the 7 genes in wheat (Sr6–Sr12) conditioning resistance to stem rust [*Puccinia graminis*] races 15B and 56. The locations of several genes reported elsewhere [cf. **36**, p. 521] were confirmed.

Lyles (W. E.), Futrell (M. C.), & Atkins (I. M.). **Relation between reaction to race 15B of stem rust and reducing sugars and sucrose in Wheat.**—*Phytopathology*, **49**, 5, pp. 254–256, 2 graphs, 1959.

The relation of carbohydrate fractions to rust susceptibility at 3 stages of growth was studied by the U.S. Dept Agric. and the Texas Agricultural Experiment Station in Khapli and Minnesota II–50–17 wheats, resistant to race 15B of *Puccinia graminis*, and Hard Federation and Nugget, susceptible, all alternatively untreated or treated with maleic hydrazide [cf. **37**, p. 224]. The level of reducing sugars in particular was higher in vars. resistant to 15B than in those susceptible, untreated Minn. II–50–17 having the largest amount of reducing sugars in all 3 growth stages (tillering, jointing, and 'soft dough') and being the most resistant. Maleic hydrazide (1,000 p.p.m. of the Na salt applied at the 5-leaf stage at 75 ml./10 ft. row) significantly decreased the reducing sugars in the resistant vars. and increased them in the susceptible, though not to the level of untreated Minn. II–50–17. There was significantly more reducing sugar in resistant isogenic lines from the cross Newthatch-Frontana × Renacimiento-Kenya than in their respective susceptible counterparts, low reducing-sugar content apparently being associated both with susceptibility in the isogenic lines and with that induced by maleic hydrazide in

Khapli. Susceptible isogenic lines were also lower in sucrose than resistant sister lines.

Bridgmon (G. H.). **Production of new races of Puccinia graminis var. tritici by vegetative fusion.**—*Phytopathology*, **49**, 6, pp. 386–388, 1959.

A more detailed account from the University of Minnesota, St. Paul, of information already noticed [**37**, p. 81]. The mixed inoculations produced at least 16 races that differed from their parents in spore colour and pathogenicity.

Campos (A.). **The importance of stem rust races in relation to the production of rust resistant Wheats for Mexico.**—*Diss. Abstr.*, **19**, 8, p. 1904, 1959.

Evaluation at Chapingo, Mexico, of wheats from different parts of the world showed that native parents were generally susceptible to stem rust [*Puccinia graminis*] races 11, 15B, 29, 48, 49, 125, and 139 [**37**, pp. 711, 766; **38**, p. 251] except Barrigon Yaqui and Barrigon Zamora which had seedling resistance to 3 or 4 races and adult resistance to more. Introduced parents, Egypt 101 [**37**, p. 637] and Kenya 324, furnished resistance to race 15B; Gabo [**37**, p. 468], Frontana, Newthatch [**38**, p. 196], Rio Negro, and Thatcher had different degrees of resistance to all races except 15B, and Hope [**37**, p. 391; **38**, p. 250] to races 48 and 125. Kenya Farmer [**37**, p. 530] was the best of potential parents, having seedling resistance to all rust isolates; 33 nameless hybrids with excellent resistance but unsatisfactory agronomically were kept for breeding. Nearly 70 hybrids were resistant to 15B and many were resistant to 29 and 49; Cajeme 54, Cajeme 54A, Gabo 54 [**36**, p. 640], Gabo 54A, Mayo 54, Yaktana 54, Yaqui 53A, and Kentana 54 were resistant to all isolates studied. In Minnesota, of 16 improved wheats, 6 parents, and 5 potential parents studied, Yaqui 53 and Yaqui 53A were outstandingly resistant to races 11, 29, 48A, 49, and 139 from Mexico, and 15B from Minnesota, while Cajeme 54, Cajeme 54A, Gabo 54, and Gabo 54A, the best wheats in Chapingo experiments, were resistant to 4 races and had temp. sensitive reactions to Minnesota 15B. Races 11, 29, and 48, of which biotypes doubtlessly exist in Mexico, were more aggressive on more of the improved wheats than other races.

Green (G. J.) & Samborski (D. J.). **Physiologic specialization in the Wheat rusts in Canada.**—*Robigo, 1959*, 7, pp. 1–5, 2 maps, 1959. [Spanish translation.]

In this further report from Winnipeg [cf. **38**, p. 196] differences in prevalence of races of stem rust [*Puccinia graminis*] between E. Canada and the Prairie Provinces and the occurrence of a distinct group in British Columbia are noted; races 29 and 48A are more frequent in Ontario and Quebec than elsewhere. Selkirk, resistant to the common races including 15B, remains virtually free from infection. The durum wheat var. Ramsey is resistant to all races except 15B–4 (Can.), which is not prevalent. The main areas of distribution of leaf rust [*P. triticina*] are the Prairie provinces, where races 5, 15, and 126 predominate, the W. Coast, and E. Canada. Thatcher is highly susceptible, Selkirk moderately resistant, and all the recommended durums are resistant.

Da Silva (A. R.). **Differential varieties used at the 'Instituto Agronomico do Sul' for rusts race identifications.**—*Robigo, 1959*, 7, pp. 6–7, 1959. [Portuguese and Spanish translations.]

The vars. are listed, with brief notes.

Johnston (C. O.). **Principal commercial varieties of Wheat grown in the United States, their reactions to rusts, and source of rust resistance shown.**—*Robigo, 1959*, 7, pp. 10–13, 1959. [Spanish translation.]

Information on *Puccinia graminis* and *P. triticina* in recent years is tabulated.

Johnston (C. O.). **The present status of physiologic races of the leaf rust of Wheat in the United States.**—*Robigo, 1959*, 7, pp. 9–10, 1 map, 1959. [Spanish translation.]

Data are given for the races of *Puccinia recondita* [*P. triticina*] in the 5 main wheat-producing areas of the U.S.A. [cf. **38**, p. 197].

Basile (Rita), Leonori-Ossicini (Agnese), & Zitelli (Giuseppina). **Identificazione di razze fisiologiche di Puccinia rubigo-vera tritici (Erikss. et Henn.) Carl. (= P. triticina Erikss.) isolate da campioni provenienti da varie regioni d'Italia (anni 1953, 1954 e 1955).**

Specializzazione fisiologica di razze di ruggini dei cereali isolate da materiale italiano raccolto durante l'annata 1956. Puccinia recondita Rob. ex Desm. (= P. rubigo-vera (DC.) Wint. f. sp. tritici (Erikss.) Carl.).—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **16** (*1958*), 1, pp. 1–12, pp. 13–18, 1959. [English summaries.]

Already noticed [**37**, p. 531; **38**, p. 252].

Peturson (B.) & Forsyth (F. R.). **The effect of amount of water used in application on fungicidal efficiency of a rust control chemical.**—*Plant Dis. Reptr*, **43**, 5, pp. 556–557, 1959.

Trials at the Canada Dept Agric., Winnipeg, on the control of leaf and stem rust of wheat [*Puccinia triticina* and *P. graminis*: cf. **38**, p. 316] in 1957–8 showed that nabam+$ZnSO_4$ ($1\frac{1}{2}$ qt.–3 lb./acre) and 65% zineb (2 lb./acre) were as effective when applied (by knapsack sprayer or atomizer) in 5–10 gal. water/acre as in 50–100.

Dickson (J. G.). **Chemical control of cereal rusts.**—*Bot. Rev.*, **25**, 3, pp. 486–513, 1959. [205 ref.]

In this review 12 groups of compounds are considered, arranged, in part, in historical sequence, concluding with a review of chemical composition of the cereal plant and its metabolism under infection. The more recent literature on the physiology of parasitism and growth is reviewed, especially where associated with the suggestion of new chemicals or the elucidation of the physiology of their action. Important articles on insecticides and herbicides are included. Lines for further basic research are discussed.

Săvulescu (Alice), Stănescu (Nely), & Eșanu (V.). **Schimbari în activitatea fiziologică a plantuțelor de Grîn atacate de ciuperca Ustilago tritici (Pers.) Jensen.** [Changes in the physiological activity of Wheat plants attacked by the fungus *U. nuda*.]—*Anal. Inst. Cerc. Agron.*, N.S., **25** (*1957*), 6, pp. 537–549, 5 graphs, 1958. [Russian and French summaries. Received 1959.]

At the Phytopathological Section of the Institute for Agricultural Research, Bucharest, inoculation of the wheat vars. Lutescens 62 and Bankut 1201 with *U. nuda* [**33**, p. 410], was followed during the 1st 2 days by a lowering of respiration, compared with healthy plants, then an increase to a max. on the 6th day. Enzyme activity was higher in diseased plants, with a max. on the 6th day. Sugar content was lower, reaching a min. during the most intensive respiration and enzyme activity. Water content was increased by infection.

Muravïov (V. P.). Мінливість мокрої сажки Пшениці в залежності від розвитку її у різних сортах рослини-господаря. [Variability of stinking smut of Wheat in relation to its development on different host plant varieties.]—Вісн. Акад. Наук Укр. [*Visn. Akad. Nauk Ukr.*], **30**, 3, pp. 46–56, 1959.

A collection of *Tilletia tritici* [*T. caries*: cf. **37**, pp. 331, 767] was obtained from the winter wheat Ukrayinka in the field and used in experiments begun in 1951 at the

Academy of Sciences of the Ukrainian S.S.R., Kiev, to seed inoculate 8 winter wheat vars. possessing different grades of resistance: resistant, Bilotserkivs'ka 200 and L'hivs'ka 3612; moderately damaged, Lutescens 17, Kharkhivs'ka 917, and Erythrospermum 15; severely damaged, Lisostepka 75; and rather susceptible, Lutescens 9 and Ukrayinka 246. At the end of the season 8 populations were obtained which differed considerably in their degree of parasitic activity; that from L'hivs'ka was the most virulent, that from Ukrayinka the least. A recurrent correlation was established between the virulence and the resistance. First generation bunt populations also differed in aggressiveness. Those from Bilotserkivs'ka 200, L'hivs'ka 3612 and Erythrospermum 15 were highly aggressive, spreading very quickly to other vars.; those from Lutescens 9 and Ukrayinka the least. Second generation populations (2 cycles through these 2 susceptible vars.) caused much greater damage than 1st. Though resistant vars. may be susceptible to the more virulent biotypes, this is presumed to have no real influence on the massive epiphytotics of bunt.

Wenham (H. T.). **Studies on Septoria leaf blotch disease of Wheat (Triticum aestivum L.) caused by Septoria tritici Desm.**—*N.Z. J. agric. Res.*, **2**, 2, pp. 208–213, 5 fig., 1959.

This disease, 1st recorded in N.Z. in 1927 as *S. graminum* [cf. **7**, p. 224; **18**, p. 297], is highly specialized there and confined to wheat. It was present in 43 of 56 crops inspected in Canterbury during the spring of 1953 and has since been prevalent every year, particularly during periods of prolonged cool weather. Spores from stacked wheat remain viable for at least 5 months, the germination percentage declining rapidly in June. Infected volunteer wheat plants have been located each month of the year and results of experiments reported from Massey Agricultural College, Palmerston North, indicate that the fungus may also persist from Feb. to May as viable spores within pycnidia of diseased leaves. With leaf decay, fragments bearing pycnidia may be dispersed by wind and cause further primary infection, thus autumn volunteer wheat should be removed and straw and stubble of infected crops destroyed either by deep ploughing or burning.

Sallans (B. J.). **Recovery in Wheat from early infections by Helminthosporium sativum and Fusarium culmorum.**—*Canad. J. Pl. Sci.*, **39**, 2, pp. 187–193, 1959.

In further studies at the Canada Dept Agric., Saskatoon, Saskatchewan, in 1942 [**19**, p. 525] the 2 wheat vars. Reward and Thatcher were about equally stunted when seed-inoculated with *H. sativum* [*Cochliobolus sativus*: cf. **38**, p. 362], but while Reward made a notable recovery, as judged by the areas of successively formed leaves on the main culm, Thatcher recovered only partially, and produced a smaller yield. Inoculation with *F. culmorum* produced less stunting, and a less marked, though significant recovery as indicated by increased area of the later leaves. When inoculated simultaneously on the same plant the 2 fungi produced more initial stunting and a greater recovery than either fungus alone.

Tuite (J.). **Low incidence of storage molds in freshly harvested seed of soft red winter Wheat.**—*Plant Dis. Reptr*, **43**, 4, p. 470, 1959.

Studies with this wheat at Purdue University, Lafayette, Indiana, confirmed results obtained elsewhere with other wheat vars. [cf. **36**, pp. 685–690].

Campbell (W. P.) & Tyner (L. E.). **Comparison of degree and duration of susceptibility of Barley to ergot and true loose smut.**—*Phytopathology*, **49**, 6, pp. 348–349, 1959.

At the Canada Dept Agric., Edmonton, Alberta, 12 vars. of barley, selected after

preliminary field inoculation of 25 vars. with *Claviceps purpurea* [**38**, p. 140] and including the most and least susceptible, were inoculated in the greenhouse at heading time with *C. purpurea* and *Ustilago nuda* (10 plants each) by hypodermic injection of spore suspensions between the bracts into the floral cavity, inoculation then being repeated on different plants every 2nd day for 10 days. Ergot infection was estimated at maturity; seed from plants inoculated with *U. nuda* was sown the following yr. and the resultant number of smutted heads observed.

Max. susceptibility to ergot occurred as the plants 1st headed (27–42% infection); to loose smut within 4 days of heading (max. 41% in Wolfe, 26% among the other vars.); susceptibility to both gradually decreased subsequently and was negligible after 10 days. The vars. remaining susceptible to ergot longest were those most susceptible in the field. Trebi, Titan, Velvon, and Warrior showed little or no infection by *U. nuda*,, though very susceptible to ergot. Infection by the 2 pathogens apparently depends on different factors.

Heinrich (J.). **Wyniki doświadczeń ze sztucznym zakażeniem odmian Jęczmienia ozimego głownią zwartą (Ustilago hordei Pers.).** [Results of experiments on artificial inoculation of winter Barley varieties with covered smut (*U. hordei*).] —*Hod. Rośl. Aklim. Nasien*, **3**, 1, pp. 143–150, 1959. [Russian and English summaries.]

During tests carried out in Cracow, Poland, 27 winter barley vars., 10 of which are cultivated in Poland, were inoculated with *U. hordei* using the partial vacuum technique of Zade [cf. *Arch. PflBau.*, **5**, p. 43, 1938–9], which was satisfactory when applied to a sufficiently large amount of material. The following vars. were seriously infected: Śląski I, Peragis 12, Derenburger, Vogels Agaer, Hanses Hübitzer, Peragis Mittelfrühe, Strengs Doria, and Antoniński SWHN. Carstens Zweizeilige and Mansholts Groninger were completely resistant.

Webber (G. D.). **Sowing clean seed will help to sell our Barley.**—*J. Dep. Agric. S. Aust.*, **62**, 9, pp. 399–402, 411, 5 fig., 1959.

A series of recommendations to growers to build up disease-free stocks from the small lots of guaranteed pure seed now available at the Barley Board or Department of Agriculture.

Simons (M. D.) & Michel (L. J.). **A comparison of different methods used in conducting surveys of races of the crown rust fungus.**—*Plant Dis. Reptr*, **43**, 4, pp. 464–469, 1 graph, 1959.

Studies by the U.S. Dept Agric. and Iowa Agricultural Experiment Sta., Ames, of recently advocated methods of procedure concerning *Puccinia coronata* [**35**, p. 761; cf. **37**, p. 405] showed that assessment of races 202 and 216 by single-pustule isolates agreed pretty well with results from bulk collections and gave more accurate estimates of races 264 and 290; such isolates also differentiated races better. Most collections from susceptible vars. contained mixtures of races. The use of many bulk collections to inoculate potentially resistant new strains of oats, however, gave information not otherwise obtainable.

Simons (M. D.), Sadanga (K.), & Murphy (H. C.). **Inheritance of resistance of strains of diploid and tetraploid species of Oats to races of the crown rust fungus.** —*Phytopathology*, **49**, 5, pp. 257–259, 1959.

Further studies at Iowa State College, Ames, concerned the number of genes for resistance to *Puccinia coronata* carried by certain diploid and tetraploid oats and the dominance and allelic relationships of these [cf. **38**, p. 79]. In the diploid *Avena strigosa* 1 major dominant gene conditioned the light flecking reactions of C.I. 7010 to races 202, 203, 216, and 264, with 1 minor gene probably also involved. The highly resistant reactions of C.I. 2630 to races 205, 216, and 214 were conditioned

by single dominant genes, as were the light flecking reactions of C.I. 3815 to races 205, 227, and 294. The genes for resistance carried by these 3 vars. were not allelic.

In the tetraploid *A. abyssinica* 1 gene that lacked dominance conditioned the heavy flecking reactions of C.I. 7233 to races 202, 203, 205, and 264, and the 2-type reaction to race 216, and 1 dominant gene conditioned the light flecking reaction of C.I. 7232 to race 264; these 2 genes were not allelic.

Zillinsky (F. J.), Sadanaga (K.), Simons (M. D.), & Murphy (H. C.). **Rust-resistant tetraploid derivatives from crosses between Avena abyssinica and A. strigosa.**—*Agron. J.*, **51**, 6, pp. 343–345, 1959.

In a co-operative programme between the Canada Dept of Agriculture and Iowa Agricultural Experiment Station it was determined that the crown rust (*Puccinia coronata*) [**38**, p. 255] resistance of fertile tetraploid hybrids, carrying also resistance to stem rust (*P. graminis* f.sp. *avenae*) [loc. cit.], was derived from *A. strigosa* (vars. Saia and C.D. 3820), almost immune from nearly all races of crown rust; the source of their stem rust resistance is still to be determined: the possibility that vars. of *A. abyssinica* other than that used here (C.D. 4549) could have been the source is not excluded. The hybrids from resistant tetraploid cultivated oat vars. are being used for back-crossing.

Ivanoff (S. S.). **Studies on Helminthosporium leaf blotch of Oats (Pyrenophora avenae).**—Abs. in *Phytopathology*, **49**, 5, p. 318, 1959.

This has been serious in Mississippi over the past 3 yr. [cf. **38**, p. 512], the pathogen attacking seedling roots as well as parts above ground. Root infection was transmitted in the laboratory by infested seed and by seed inoculation at 100% R.H. at 24 and 28° C., when the root and coleoptile were destroyed in 12 days. Soaking infested seed in 5% NaCl for 24 hr. or 1 : 1,000 $HgCl_2$ for 10 min. considerably reduced infection; dusting seed samples, which otherwise showed 66% natural infection, with ceresan M ($\frac{1}{2}$ oz./bush.) gave complete control. Wet field conditions at harvest time increased seed infection.

Vanterpool (T. C.). **Heat and drought damage to cereals.**—*Plant Dis. Reptr*, **43**, 4, pp. 475–476, 2 fig., 1959.

At the University of Saskatchewan, Saskatoon, Canada, 2 new physiological conditions of cereals caused by prolonged drought are described. Heat canker on 6–7 in. oat plants was caused by a day air temp. of 87–95° F., with surface-soil temp. up to 130°, high enough to kill the tissues of young plants. Drought lodging in oats, not previously observed, was caused by dry top soil and soil drifting, resulting in the death of lodged plants after 2 or 3 weeks. The prolonged dry weather and wind erosion prevented the crown roots from making contact with the sub-soil moisture, and high winds sometimes broke the plants. Oats were more affected than barley; wheat was resistant.

Le Conte (J.). **Contribution a l'étude génétique de la résistance du Maïs a la rouille (Puccinia polysora) et resultats pratiques obtenus au Dahomey.** [A contribution to the genetical study of the resistance of Maize to rust (*P. polysora*) and the practical results obtained in Dahomey.]—*Riz et Rizic.*, **5**, 2–3, pp. 98–116, 6 graphs, 1 map, 1959. [English and Spanish summaries.]

The investigations covered 12 successive crops (1952–58). The 1st part of the paper deals with the genetics of the factors of resistance [cf. **38**, pp. 55, 514] and covers the effect of resistance on yield; a genetical study of resistance in an intervarietal hybrid; an example of fixation of resistance in an intervarietal hybrid; an example of the transfer of the resistance genes to a susceptible line; a study of intervarietal hybrids with resistance genes of different origins; and the transfer of resistance

genes by repeated back-crossing and the effect on yields. The 2nd part treats of the multiplication of the improved lines and the distribution of the seed.

Analysis of the development of a local line of maize made resistant by a progressive conc. of genes from the same line demonstrated that infection may in certain seasons cause a $\frac{2}{3}$ reduction in yield.

It appears that the gains in yield resulting from the fixation of the resistance character are not wholly due to the genes controlling this character, but are partly due also to the genes controlling productivity, which are linked to the former. Though the introduction of resistance genes from another var. may be a permanent factor in the increased yield, the fixation of a resistance character, i.e. increasing the frequency of the genes controlling it, might cause a regression in the yield increase through excessive restriction of genetic variability. The results obtained, which are not yet complete, are not to be interpreted as being confined to maize alone; in many cases they could be extended to more slowly growing plants, for which maize is an excellent 'pilot' plant.

The maize lines used for distribution were, chronologically: $\frac{3}{4}$ local maize derived from the American var. Capetown, $\frac{3}{4}$ local maize derived from Venezuela III, $\frac{7}{8}$ local maize derived from Capetown. Later, local lines will take the place of these. The yields of the newly distributed lines are 30–50% over all others tested. An organization was specially formed to undertake distribution and in 1956–58 it distributed about 870 tons of seed. The gains in yield more than cover the cost of the operation.

Salunskaya (Mme N. I.), Rudenko (L. P.), & Vinokurova (Mme T. M.). Химическая борьба с пузырчатой головней. [Chemical control of blister smut.]—Кукуруза [*Maize*], **4**, 6, pp. 61–62, 1959.

In field experiments against blister smut [*Ustilago maydis*: cf. **38**, p. 203] at the Ukrainian Scientific Research Institute for Plant Protection, using the maize var. Voronezhskaya 76 sown on plots which carried an infected crop in 1956, the soil was treated in 1957 with 1 and 2% solutions of DNOC (750 l./ha.). Before emergence spores were scattered over the surface (1·5 g./sq. m.). In 1958 there was a reduction of infection from 2·79% in untreated plants to 1·49% with the 1% solution, and to 1·08% with the 2% solution. When 1,500 l./ha. were applied, infection was reduced from 12·2 to 1·2% and with 3,000 l./ha. to 1·8%. In laboratory tests on sporidia sown on potato dextrose agar slants phygon, captan, and fuclasin were the most toxic followed by thiram and DNOC. When sporidial suspensions and fungicidal solutions were applied to leaves on the same day before the appearance of the panicles, with a further treatment when 4–6 leaves appeared, captan, zineb, and heptachlor were very effective, reducing infection to $\frac{1}{3}$ compared with untreated. With thiram, however, there was no infection.

Schieber (E.). **Tar spot of Corn in Guatemala.**—*Plant Dis. Reptr*, **43**, 6, p. 673, 1959.

Phyllachora maydis caused considerable damage to maize in the highlands of Guatemala; though previously observed in the country by Melhus [**33**, p. 598] it had been only of minor consequence. This pathogen has also been reported from Nicaragua [**36**, p. 683], Puerto Rico, Cuba, and Mexico.

Nichols (C. W.) & Wilkey (R. F.). **Hoja blanca (white leaf), a destructive virus disease of Rice.**—*Bull. Calif. Dep. Agric.*, **48**, 1, pp. 32–36, 5 fig. (3 col.), 1959. [17 ref.]

A general account of the symptoms, host range, and vector of the disease [**38**, p. 81 *et passim*; map 359].

Padmanabhan (S. Y.). **The present position and control of Rice diseases in India.** —*Proc. Indian Acad. Sci.*, Sect. B, **49**, 5, pp. 349–362, 1959. [30 ref.]

The author reports from the Central Rice Research Institute, Cuttack, that in India diseases of rice cause about 10% loss of production annually [cf. **36**, p. 209] (approx. 2,500,000 tons). The most important are blast (*Piricularia oryzae*) [**38**, p. 593], helminthosporiosis or brown eye spot (*Cochliobolus miyabeanus* [cf. **37**, p. 719]), stem rot (*Sclerotium oryzae* [cf. **36**, p. 518]), and foot rot (*Gibberella fujikuroi* [**36**, p. 724]). Brief accounts are given of these diseases. In addition *Ephelis oryzae* [**32**, p. 211] is noted as being of some consequence in parts of Bombay and Orissa, and a physiological root-rot complex [**37**, p. 232] reduced yields in some seasons in Bengal, Bihar, and parts of Uttar Pradesh and Madhya Pradesh.

Beier (R. D.), Panzer (J. D.), & Tullis (E. C.). **The interrelationship of nitrogen and other factors affecting the blast disease of Rice caused by Piricularia oryzae Cav.**—*Plant Dis. Reptr*, **43**, 4, pp. 477–482, 2 graphs, 1959.

Fields on Pompano and Charlotte fine sand at Fort Pierce, Florida, sown with Century Patna 231 rice, 4 plantings at monthly intervals, only the 1st being inoculated (when 42 days old), all with N (as urea) applied at rates of 30, 60, 120, and 240 lb./acre, showed that with increased N there was an increase in leaf blast (*P. oryzae*) [cf. **37**, p. 534]. This increase, however, seemed to be dependent also on the interaction of N fertilization with the amount of inoculum present, weather conditions, and the age of the plant. Plants inoculated when relatively resistant and under weather conditions unfavourable for blast were severely attacked only at the highest N level; this was considered to be a result of prolongation of the period of susceptibility of the plants by alteration of their general metabolism, lengthening the period of active growth. Head blast appeared unaffected by N treatments, but rice heads earlier under high N.

Vanderweyen (A.). **L'helminthosporiose du Riz au Congo belge.** [Helminthosporiosis of Rice in the Belgian Congo.]—*Bull. agric. Congo belge*, **50**, 3, pp. 649–659, 1 col. pl., 2 fig., 1959. [Flemish summary.]

A general account of the disease of rice caused by *Helminthosporium oryzae* [*Cochliobolus miyabeanus*] with reference to its occurrence in the Belgian Congo [**36**, p. 308].

Burke (J. H.). **Citrus industry of Brazil.**—*Foreign agric. Rep.* 109, 33 pp., 12 fig., 1 map, 1958.

This report, based on a survey made in 1957, and primarily concerned with the commercial production and marketing of citrus, notes the following diseases (pp. 13–15): tristeza virus [**38**, p. 3], exocortis virus [**38**, p. 83], xyloporosis virus [cf. **33**, p. 535], psorosis virus [**35**, p. 180], gummosis [*Phytophthora* spp.: **26**, p. 287], rubelosis [*Corticium salmonicolor*: **17**, p. 454], sour orange scab [*Elsinoe fawcetti*: **33**, p. 478], sweet orange scab [*E. australis*: **16**, p. 451], melanose [*Diaporthe citri*: **33**, p. 479], and citrus canker [*Xanthomonas citri*: **37**, p. 284].

Weathers (L. G.) & Calavan (E. C.). **The occurrence of cachexia and xyloporosis in California Lemon varieties, with particular reference to the old-line Eureka Lemon.**—*Plant Dis. Reptr*, **43**, 5, pp. 528–533, 2 fig., 1959.

Graft inoculations by the University of California Citrus Experiment Station, Riverside, of scions from a large number of lemon selections onto seedlings of vars. and hybrids of mandarin orange and Palestine sweet lime resulted in the appearance of cachexia-xyloporosis virus symptoms [cf. **38**, p. 258] from only 2 unimportant Lisbon lemon selections, indicating rarity of the disease in commercial lemons

in California. Sweet lime grafted with lemon scions known to be infected with exocortis virus [loc. cit.: **38**, p. 596] developed shallow, elongated cracks in the bark, but no wood pitting. The cause is unknown, but may be the exocortis virus.

McBride (J. J.). **Reaction of zineb with copper compounds, oil deposits when applied with zineb, and deposits of zineb when applied with a variety of materials.** —*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 118–122, 1 graph, 1959.

In studies at Florida Citrus Experiment Station, Lake Alfred, on Zn deposits on citrus foliage, it was established that the addition of Cu compounds to zineb sprays results in the formation of copper ethylene-bisdithiocarbamate and a corresponding reduction in the amount of the Zn compound deposited by the spray. When oil is combined with zineb sprays the amount of oil deposited is greater than when the oil is applied alone.

Lead arsenate, calcium arsenate, and zinc sulphate+lime slightly reduced the amount of zineb deposited from zineb sprays, but did not greatly affect the final residues.

Eckert (J. W.). **The place of the fungistat.**—*Calif. Citrogr.*, **44**, 8, pp. 281–283, 1 fig., 1959.

A popular note defining terms used in the citrus trade to describe spoilage. It is emphasized that although, with adequate refrigeration, fruit dispatched without the protection of biphenyl [diphenyl] sheeting [cf. **37**, p. 166] may arrive at market with little loss, its sales life is shorter than that of protected fruit.

Botella Soto (C.), Royo Iranzo (J.), & Primo Yufera (E.). **Diagnóstico foliar. I. Relación entre ciertos carácteres anómalos observados en algunas zonas de cultivo del Naranjo y el contenido en oligoelementos de las hojas.** [Foliar diagnosis. I. Relationship between certain anomalous characters observed in some Orange-growing regions and the micro-element content of the leaves.]— *Bol. Inst. Invest. agron., Madr.*, **19**, 40, pp. 51–66, 1 map, 6 col. fig., 1959.

Chemical analyses at the Departamento de Química Vegetal, Patronato 'Juan de la Cerva', Facultad de Ciencas, Valencia, of healthy orange leaves from a southern Valencia grove and others exhibiting symptoms of a type previously undescribed, comprising an intense uniform yellowing of the entire leaf except the midrib, indicated an excess of B (390 p.p.m.) and Cu (18·4 p.p.m.).

In groves exhibiting the symptom familiarly known as 'clareta', i.e. local swellings on the peel, with translucent borders, yielding to mild pressure, the leaves were high in Cu (above 10 p.p.m.), but there was no correlation between symptom severity and Cu level: in 2 of these groves low Zn (below 20 p.p.m.) found expression in an accumulation of green round the principal veins. Zn levels were low in all except 1 of the properties studied.

Leonard (C. D.), Stewart (I.), & Edwards (G.). **Soil application of zinc for Citrus on acid sandy soil.**—*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 99–106, 1959.

When various different Zn sources, alone and combined with 1 or more other materials, were applied to the soil round orange trees growing on acid sandy soil in 2 groves at Florida Citrus Experiment Station, Lake Alfred, in 1956–58, all the Zn compounds applied alone failed to increase substantially Zn uptake by the trees, whatever the method of application. A mixture of 5 lb. each of $ZnSO_4$ and $CaCl_2$ applied to Lakeland sand in 10 piles each of 1 sq. ft. area or 60 smaller piles increased the leaf Zn from 47 p.p.m. in leaves of untreated trees to 115–219 p.p.m. Preliminary results from the application of this mixture in 5 piles/tree in 1958 gave Zn levels of over 300 p.p.m.

A mixture of Zn EDTA with soda ash applied in piles or in a narrow band in

amounts sufficient to raise the soil pH to 10 also gave a very high conc. of Zn in the leaves. All broadcast applications of Zn sources were ineffective.

Embleton (T. W.) & Jones (W. W.). **Magnesium deficiency of Orange and its correction.**—*Calif. Citrogr.*, **44**, 7, pp. 219, 236–240, 1 fig., 1959. [16 ref.]

In 3 experiments by the University of California Citrus Experiment Station foliage sprays of magnesium nitrate at 10 lb./100 gal., applied when the spring flush of growth was about $\frac{2}{3}$ expanded, showed considerable promise for the correction of Mg deficiency in orange [cf. **34**, p. 297], giving substantial increases of the element in the leaves. Deficiency symptoms were markedly reduced within 2 months and practically eliminated in 6. Mg chelate foliage sprays at 4–5 lb./100 gal. were less effective and injured the fruit.

Annual report and accounts of the Coffee Board of Kenya for the year ended 31st March, 1959.—*Kenya Coffee*, **24**, 281, pp. 165–181, 187, 1959.

In the section of this report dealing with pathology (pp. 171–172) it is stated that race II of *Hemileia vastatrix* [cf. **38**, p. 518] is found in all parts of Kenya, but race I, to which the Kent vars. are susceptible, has been recorded only from Teita, Meru, Elgon, and North Nyanza. In spite of repeated tests with material from the same source, race VII, reported by d'Oliveira from material collected in Yabe, South Nyanza [cf. **35**, p. 164], was not isolated.

Spores of races I and II were germinated under different conditions. It was ascertained that exposure to strong sunlight killed them in 48 hr. or less, that the spores usually remained viable for 3–4 weeks, and that germination could take place in subdued light.

Experimental evidence showed that the control given by each application of spray persisted for about 4 months. Experiments to compare the solubility and precipitation of 7 fungicides are in progress. All Cu fungicides available locally were tested. Weighed quantities were mixed in the appropriate vols. of water and allowed to settle. The relative speeds of precipitation and the condition of the fluid were noted, and chemical assays made of the amount of Cu remaining in the supernatant fluid. Further tests are being made in the field with a Cu dust. A comparison of sprayers by means of chemical assay, rubeanic acid prints, and rust counts indicated that the Micron was as efficient as the Master though using less fluid, and the Warley Eclipse was ahead of both.

Culot (J. P.). **Symptômes de déficience nutritive du Caféier Robusta dans la Cuvette congolaise.** [The symptoms of nutritional deficiency of Robusta Coffee in the Congo Basin.]—*Bull. Inform. Inst. Étud. agron. Congo belge*, **8**, 3, pp. 189–199, 8 col. fig., 1959.

The visual symptoms of N, Mg, and K deficiency, as they appear on Robusta coffee in the central part of the Congo basin, Belgian Congo, are described and illustrated [cf. **36**, p. 101; **38**, p. 5], with some account of the circumstances which may induce them.

Staffeldt (E. E.). **Thielaviopsis basicola, a part of the Cotton (Gossypium hirsutum) seedling disease complex in New Mexico.**—*Plant Dis. Reptr*, **43**, 4, pp. 506–508, 3 fig., 1959.

From the State College, New Mexico, is noted the prevalence of *T. basicola* [cf. **34**, p. 723; **37**, p. 662], which is primarily isolated from cotton tissues located at or below the soil line, invading mainly plants grown in clay soil. Infection in the field varied from 0–100%, but very few plants exhibited internal infection. All the genetic lines were susceptible but tolerated invasion and later exhibited a high degree of active pericyclic resistance.

Dark (S. O. S.). **Some interactions of Xanthomonas malvacearum with the B series of black-arm resistance genes in Cotton.**—Abs. in *Proc. 10th int. Congr. Genet.*, **2**, p. 65, 1958.

At the Empire Cotton Growing Corp., and the Ministry of Agriculture, Sudan, the gene combination B_2B_3, which usually gives field resistance to the Sudan cotton crop against *X. malvacearum* [**38**, p. 207], was found to break down under water-logging. This occurred temporarily in 1956 in Sakel and Lambert, carrying B_2B_3, when water-logged in the Gezira. In Shambat, however, the mean resistance grades (0 immune—12 fully susceptible) of the 2 vars. were 5·5 and 5, respectively. In 1957 there was no black-arm in Gezira.

Street (P. F.). **Effects of antibiotics on control of angular leaf spot of Cotton.**—*Diss. Abstr.*, **19**, 9, p. 2221, 1959.

In replicated field trials organized in Texas in 1955 and 1957 by the Iowa State College 5 antibiotics, applied to the foliage at 5 and 10 p.p.m., failed to prevent infection of the leaves, stems, and bolls of cotton by *Xanthomonas malvacearum* [**38**, p. 407] when bacteria were sprayed on to the foliage after spraying with the antibiotics.

In a greenhouse experiment in 1957–8 acid-delinted seed of Deltapine and Rowden, previously soaked in a mixture of races 1 and 2 of the pathogen, was treated with fungicides in steamed greenhouse soil and maintained at 85° F. Emergent seedlings were counted and each cotyledon was assigned to an infection class as follows: 1, no disease; 2, 0–10% surface area diseased; 3, 11–40%; 4, 41–90%; and 5, 91–100%. Ceresan dust (2, 4, 8, and 10 oz./100 lb. seed) gave significant increases of stand in Deltapine. At 2 oz. it also gave a significant reduction of cotyledonary infection in Deltapine and, at 4 oz., in Rowden. Omadine at 8 oz. gave a significant reduction of cotyledon infection in Rowden only. Streptomycin at 1,000 p.p.m., the highest rate used, significantly increased cotyledonary infection in Deltapine.

Rangaswami (G.). **Effect of some antibiotics on Xanthomonas malvacearum (E. F. Smith) Dowson and on the microflora of Cotton seed.**—*Indian Phytopath.*, **10**, 1, pp. 8–10, 1957.

At the Agricultural College and Research Institute, Coimbatore, all the preparations containing streptomycin [cf. **36**, p. 203] as the main active ingredient, viz. streptomycin sulphate, agristrep, agrimycin, and phytomycin, and also mycothricin [cf. **36**, p. 684] were quite effective at very low conc. in checking the growth of *X. malvacearum in vitro*. Seeds of MCU1 cotton seeds, highly susceptible to *X. malvacearum*, were treated with these antibiotics at 500 and 1,000 p.p.m. in water for 4 hours, dried in shade on sterile blotting paper, and plated on nutrient dextrose agar. At 1,000 p.p.m. the 4 streptomycin preparations and mycothricin exhibited a selective inhibitory effect on cotton seed bacteria, no colonies developing; agrosan GN and ceresan were equally effective on both the fungi and the bacteria. There were no adverse effects on germination.

Schwinghamer (E. A.). **The relation between radiation dose and the frequency of mutations for pathogenicity in Melampsora lini.**—*Phytopathology*, **49**, 5, pp. 260–269, 1 fig., 5 graphs, 1959.

In further studies at the Brookhaven National Laboratory, Upton, New York, uredospores of *M. lini* race 1 [**37**, p. 663; **38**, p. 189] were irradiated with ultra-violet rays, X-rays, γ-rays, and fast neutrons to study the frequency of induced mutations for pathogenicity at the Am am locus conditioning avirulence dominant to virulence on the flax var. Dakota, the mutations being identified by their ability

to infect this otherwise immune var. The relative importance of single and multiple events in the mutation process was estimated by fitting the data to a second-order polynomial.

The mutation frequency below the 'saturation' level of treatment was proportional to the dose with ultraviolet radiation, and nearly so in neutron treatments; in X-ray or γ-ray experiments the frequency varied approximately as the square of the dose. Analogy with similar chromosome aberrations in higher plants suggests that ionizing radiations induced mainly 'deletion' mutations, involving loss of a chromosome segment with the dominant Am allele; the ultraviolet data indicate more localized 'point' changes. The mutation rate showed a 'saturation' effect at all high lethality levels of the radiations used.

A sharp increase in the frequency of mutations induced by X- or γ-rays resulted from an increase in spore water content from 45 to 70% during irradiation. On the basis of equivalent energy absorption in tissue, fast neutrons proved much better mutagens than X-rays. The average max. frequency (% of infections) induced by fast neutrons, X-rays, and ultraviolet radiation was about 2·0, 1·5, and 0·3%, respectively. An alternative method for the estimation of the mutation rate on the basis of total irradiated spore population is also described.

Hoffmann (G. M.). **Traumatische Infektion durch Polyspora lini Laff. bei Linum usitatissimum L.** [Traumatic infection by *P. lini* on *L. usitatissimum*.]—*Naturwissenschaften*, **45**, 22, p. 554, 1958.

At the Institut für Phytopathologie, Aschersleben, Germany, the author confirmed the negative results of White's experiments on the inoculation of intact flax plants with *P. lini* [**24**, p. 506]. Infection occurred exclusively on mechanically wounded cotyledons, foliage leaves, and stems. On the uninjured leaf surface the fungus sporulated freely but neither formed appressoria nor penetrated through the stomata into the tissues, and with the development of unfavourable environmental conditions it proceeded to form chlamydospores. The cell sap exuding from the damaged tissues stimulated germination appreciably. Thus, in slide tests the av. germination of conidia at a distance of 0·5 mm. from an injured leaf margin was 36% in 16 hrs. at 18° C., as against 0·7% for intact material. The germinating mycelium rapidly penetrated the wounded tissue and became established intercellularly, producing typical leaf spots, on the necrotic portions of which the conidiophores emerged from the stomata. Contrary to the hitherto accepted opinion, therefore, *P. lini* should be regarded as a wound parasite *sensu* Gäumann [**30**, p. 574].

Ghosh (T.). **Anthracnose of Jute.**—*Indian Phytopath.*, **10**, 1, pp. 63–70, 11 fig., 1957.

Since 1954 a sp. of *Colletotrichum* has often been found in stem lesions on jute in India [**37**, p. 723] and Eastern Pakistan, while in 1950 and 1951 [**33**, p. 722] an epidemic of stem rot of Japanese Red, an exotic var. of *Corchorus capsularis*, was recorded in Chinsurah, West Bengal. In 1952 the disease was reported at the Institute at Nilganj affecting Japanese Red and 3 single plant selections from indigenous types of *C. capsularis*. In 1953 Broad Leaf Type, a *capsularis* var. derived from material obtained from Japan, was seriously attacked, also a *capsularis* hybrid Deep Three from indigenous types. The same *Colletotrichum* sp. was isolated from all. In inoculation trials the popular cultivated *capsularis* var. D 154 [loc. cit.] was partially resistant, while symptoms developed in about 6 days in Japanese Red and Deep Three. The disease starts in the hot and humid July weather when the crop is 8–10 weeks old, damage being most severe near harvest time. The author is of the opinion that the Indian and Malayan strains [**35**, p. 453] are both *C. corchorum*.

Miller (H. N.). **Control of Pythium root rot of Chinese Evergreen by soil fumigation.** —*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 416–419, 1 fig., 1959.

In further tests in 1956–7 in commercial nurseries in the Apopka area of Florida for the control of *P. splendens* root rot of Chinese evergreen (*Aglaonema simplex*) [cf. **28**, p. 397; **33**, p. 469; **37**, p. 700], in naturally infested plots supplemented by infected debris, vapam (soil drench), mylone (broadcast), and methyl bromide (injected) gave, respectively, 29·77, 35·79, and 26% infected plants, as against 93·56% for the untreated plots. In 1958 12 walled, ground beds in a plastic greenhouse were filled with sterilized peat mixed with chopped-up infected roots and stems and treated 4 weeks later: vapam (1 qt./100 sq. ft. soil surface) gave 1·27% diseased plants, mylone ($\frac{3}{4}$ lb.) 0·51%, methyl bromide (4 lb. injected) 0·77%, and untreated 87·4%.

Vapam should be evenly drenched over the soil. Mylone may be applied in the same way or mixed dry with sand and broadcast. With either material, 3 weeks should elapse between treatment and planting.

Bolick (J. H.). **Cercospora antirrhini found in Florida.**—*Plant Dis. Reptr*, **43**, 4, p. 511, 1 fig., 1959.

This report from the State Plant Board of Florida, Gainesville, is also believed to be the 1st record of *C. antirrhini* on antirrhinum in the United States. It has previously been recorded from Guatemala.

May (C.) & Palmer (J. G.). **Experiments with captan and ferbam as systemics for control of bacterial rot of Saguaro and Organ-pipe Cactus.**—*Plant Dis. Reptr*, **43**, 4, pp. 496–497, 1959.

In further studies at Beltsville [cf. **37**, p. 603] captan applied to the surface soil ($\frac{1}{2}$ in.) at 5 lb./25 sq. ft. was taken up by saguaro plants (*Carnegiea gigantea*) and acetone extracts of the tissues inhibited growth of *Ceratocystis ulmi in vitro* [loc. cit.], but did not check infection following inoculation of the plants with *Erwinia carnegieana* [**32**, p. 67] 2 weeks after the treatment.

Ferbam applied similarly to organ-pipe cactus (*Pachycereus marginatus*) on the soil or introduced (0·5 g.) into freshly made cavities in the stem was apparently not absorbed or diffused in the plant and no control was obtained.

Németh (Maria V.). **A Szegfümozaik elterjedése a hazai remontans Szegfükultúrában.** [Spread of Carnation mosaic virus in the Carnation cultivations of the country.]—*Kertész. kutató. III. Évkönyv., 1958*, pp. 94–96, 2 fig., 1958. [English and Russian summaries.]

In an investigation in 1958 it was found that carnation mosaic virus is widespread in Hungary. *Gomphrena globosa* [cf. **34**, p. 576] has proved the best differential host of the virus and is used as an indicator in varietal selections.

Andreucci (E.). **Un avvizzimento dei germogli del Garofano prodotto da 'Phytophthora palmivora' Butl.** [A wilt of Carnation shoots produced by *P. palmivora*.]—Reprinted from *Riv. Ortoflorofruttic. ital.*, **43**, 1–2, 11 pp., 5 fig., 1959. [English summary. 17 ref.]

In recent years carnations grown at Pescia have developed a condition in which elongated, whitish spots, 1–2 mm. diam. and surrounded by a narrow, translucent halo, appear at or near the base of the outermost leaves protecting the apical bud. These spots enlarge and coalesce and 1–5 cm. of the leaf blade rapidly becomes affected. The tissues become wrinkled and flaccid and the leaf bends outwards and downwards; the diseased area dries up and becomes fragile. The condition spreads to the inner leaves and may reach the top of the stem, or passes rapidly to the base, sometimes affecting the internodes. Affected stems wrinkle and appear translucent.

In very wet weather a mycelium emerges and the tissues develop a soft rot. Young plants from cuttings are the most susceptible and if the attack is severe may be killed. *Phytophthora palmivora* was isolated from affected material.

The disease is confined to one locality, where it affects only a few local cultivars, mainly Frine and Gloria, which have rather herbaceous stems and wide, fleshy leaves. Infection appears towards the end of summer, when a high temp. is accompanied by high humidity. The disease appears to offer no serious danger locally and could be prevented by frequent spraying with Bordeaux mixture or carbamates.

McFadden (L. A.). **Bacterial blight of Chrysanthemum.**—*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 419–425, 4 fig., 1959.

At the Sub-Tropical Experiment Station, Homestead, control of *Erwinia chrysanthemi* [cf. **35**, p. 511; **37**, p. 287] was attempted with 3 formulations of streptomycin applied in 4 different ways: (*a*) added to rooting hormone powder; (*b*) liquid dip treatments; (*c*) absorption through cut ends; and (*d*) as sprays. The results showed that extreme care is necessary when chrysanthemums are treated with such formulations, which are not recommended for routine application, though they may have a limited use in propagating nurseries on specific vars. suffering extensive disease losses. The range of conc. that controlled the disease without injuring the plants appeared to be very narrow. Thus, when inoculated Iceberg plants were sprayed with agristrep [cf. **37**, p. 255], agrimycin 100 (each at 100 and 200 p.p.m. active ingredient), and agrimycin 500 (3 and 5 lb./100 gal.) the numbers of diseased plants (of 12) were, respectively, 2, 1, 3, 0, 3, and 3, as against 7 of the water-sprayed (inoculated). Foliage yellowing was most pronounced on those treated with agrimycin 100 and agristrep at 200 p.p.m.; both also caused yellowing at 100 p.p.m. Agrimycin 500 at 3 lb./100 gal. was the least phytotoxic; 5 lb./100 gal. failed to give a corresponding increase in control and caused slight yellowing.

Kelsheimer (E. G.). **Compatibility of insecticides and fungicides for Chrysanthemums.**—*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 392–394, 1 fig., 1959.

In spraying tests over 2 yr. at the Gulf Coast Experiment Station, Bradenton, it was found that the 16 spray combinations tested under normal weather conditions were not responsible for the chlorosis or necrosis present on several chrysanthemum vars. (foliage and flowers) locally. All applications benefited the plants, as shown by the greater flower wt. of the treated in comparison with the untreated plants.

Németh (Maria V.). **A Delphinium consolida L. új betegsége.** [A new disease of *D. consolida*.]—*Kertés. kutató. III. Évkönyv., 1958*, pp. 89–93, 3 fig., 1958. [English and Russian summaries.]

At the Horticultural Research Institute, Budapest, in 1956–7, the agent of a collar rot and blight of *D. consolida*, new for Hungary, was identified as *Diplodia delphinii* [cf. **30**, p. 41]. The disease appeared to be seed-borne.

Magie (R. O.). **Progress in controlling Botrytis disease of Gladiolus.**—*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 406–410, 1959.

In further fungicidal tests at the Gulf Coast Experiment Station, Bradenton, against gladiolus grey mould (*B. gladiolorum*) [cf. **37**, p. 702], antibiotics were tested as sprays and dusts on young flower spikes, which were cut about 5 days later at the tight bud stage and kept for 2 days in water. The open flowers were inoculated with a conidial suspension by spraying or dipping. Petal spots/spike following omadine thiourea (500 p.p.m.) spray numbered 31 on Valeria and 28 on Spotlight, compared with 263 and 107, respectively, on those treated with water only.

Cut spikes with tight buds were dipped momentarily in the fungicidal suspensions; 2–4 days later the open flowers were inoculated and each spike was held in

a plastic bag for 24 hr. Petal infections following griseofulvin, mycostatin, and omadine thiourea were about 60% less than those on the inoculated, untreated spikes.

In tests with fungicides used to prevent contamination of the water in which freshly cut spikes are cooled before dispatch in warm weather, promising results were given by the soluble fungicides elcide 70 (6% ethylmercuri thiosalicylic acid = thimerosal) at 250–400 p.p.m. of the formulation and by phyto-actin at 200 p.p.m. active ingredient. Captan (50%) was the most promising insoluble fungicide when used at 2 or 3 lb./100 gal.

In a test of suppression of conidial production on leaves killed by the fungus, sprayed in the laboratory, and spread out on the lawn for a few days, the following, at 2 lb. or 2 pints/100 gal., reduced the number of conidia to 15% of those washed from the untreated controls: ortho LM seed protectant (2·4% methyl mercury 8-hydroxyquinolinate), CM-19 (19% aryl- and alkyl-phenols), du Pont experimental fungicide (60% 1,2-bis (ethylsulphonyl)-1,2-dichloroethylene), and puratized agricultural spray.

It is recommended that in cut-over fields after gladiolus leaves have been injured by frost or any other cause they should be spray-drenched twice a week, 1st with maneb (2–100) then with CM-19 (2 pints/100 gal.), both +3 tablespoons triton X-100/100 gal. In cool, moist weather plants in spike should be sprayed with zineb or CM-19. When the temp. is 80° F. or more CM-19 conc. should be reduced to 1 or 1½ pints/100 gal. An extra spray of maneb or CM-19 should be applied after heavy rains.

Zineb spray (2–100) weekly is recommended for all plantings except after leaf damage or the appearance of *B. gladiolorum*. Dipping the spikes for 3 sec. in captan 2–100+1½ oz. triton X-100 is advised after rain, fog, or heavy dew if the disease is well established and sporulation heavy.

Magie (R. O.). **A new fungicide for Gladiolus corm treatment.**—*Proc. Fla hort. Soc.*, **71** (*1958*), pp. 413–416, 1 fig., 1959.

In further work on gladioli it was found that thimerosal [cf. above] appeared to control *Fusarium oxysporum* f. *gladioli* without causing as much plant injury as new improved ceresan [cf. **37**, p. 702] and dowicide B, and better than captan. Elcide 70 liquid gave results on production which compared very favourably with thimerosal powder. The former is recommended for the pre-planting corm treatment (1 hr. in 3 pints/100 gal. or 15 min. in 4 pints, both+1½ oz. triton X-100) for commercial gladiolus vars. in Florida. The corms may be planted at once or cold-stored dry.

Gould (C. J.). **Zineb shows promise for the control of leaf spot of bulbous Iris.**—*Plant Dis. Reptr*, **43**, 4, pp. 491–493, 1959.

At the State College of Washington, Puyallup, spraying tests were conducted in 1958 with 6 fungicides against iris leaf spot (*Didymellina* [*Mycosphaerella*] *macrospora*) [cf. **17**, p. 750]. Climatic conditions were opt. for the fungus, and infection was augmented with scattered diseased leaves. Eight sprays with Bordeaux at 8–12 lb. or parzate (65% zineb) at 2 lb./100 gal. water gave 53·9 and 45·7% dead leaf area, compared with the 68% on the untreated, and a higher bulb yield. Treatment with Bordeaux+wetter and standard cultural precautions still appear to give the best control, but zineb deserves further trial.

Kivilaan (A.) & Scheffler (R. P.). **Detection, prevalence, and significance of latent viruses in Pelargonium.**—*Phytopathology*, **49**, 5, pp. 282–286, 2 fig., 1 graph, 1959.

At Michigan State University, East Lansing, veneer grafting of scions from 100

plants each of 6 vars. of commercial pelargoniums into stems of virus-free pelargonium seedlings 4–6 in. high revealed latent virus infection in 62% of the scions [cf. **36**, p. 648]. The seedling reactions included symptoms classified as ringspot, necrotic ringspot, crinkle [loc. cit.], the 3 most common, also mottle, leaf cupping [loc. cit.], and mosaic [cf. **20**, p. 304], all of which generally disappear with new growth of the infected seedling; stem and top necrosis, occasionally lethal, were sometimes associated with leaf curl and necrotic ringspot. Attempts at transmission by sap, dodder (*Cuscuta arvensis*), and aphids and leafhoppers failed. Scions from lower parts of infected plants produced more distinct symptoms than those from higher up. Many of the plants shown to carry latent viruses subsequently developed virus-like symptoms, especially on the older leaves, if kept under conditions of low light and low temperature (9° C.). Attempts at heat therapy gave negative results.

The presence of viruses, especially crinkle, mottle, and necrotic ringspot, rendered pelargonium plants and seedlings of var. Ricard more susceptible to *Xanthomonas pelargonii* [**37**, p. 538].

Stathis (P. D.) & Plakidas (A. G.). **Entomosporium leaf spot of Photinia glabra and Photinia serrulata.**—*Phytopathology*, **49**, 6, pp. 361–365, 3 fig., 1959.

The pathogen responsible (*E. maculatum*) [*Fabraea maculata*: **37**, p. 8] also commonly causes leaf spot of pear, loquat, and quince in Louisiana. Comparison at Louisiana State University, Baton Rouge, of isolates from the 5 hosts showed that those from pear and quince were similar and strongly pathogenic to loquat, but not to the *Photinia* spp., isolates from which were strongly pathogenic to pear and loquat and formed larger colonies on potato dextrose agar. Isolates from loquat were strongly pathogenic to pear and weakly so to the *Photinia* spp. and formed colonies intermediate in size. Each of the 3 sets of isolates apparently represents a distinct race of the fungus; the *Photinia* race may have originated by mutation from the loquat.

Palmer (J. G.), Henneberry (T. J.), & Taylor (E. A.). **Sprays for control of powdery mildew of Roses.**—*Plant Dis. Reptr*, **43**, 4, pp. 494–495, 1959.

In tests of 15 fungicides at Beltsville, Maryland, against powdery mildew (*Sphaerotheca pannosa*) [**37**, p. 45] on outdoor roses phaltan [**38**, p. 181] at 908 g./100 gal. water gave the best control (rating 3·5 on a scale 0–10, compared with 6·25 for the control); some of the chemicals combined with thiram at 1 lb./100 gal. proved better than the chemicals alone or in other combinations. None gave complete control.

Bouron (H.), Mimaud (J.), & Ronzel (G.). **Essais de traitements contre l'oidium du Rosier Sphaerotheca pannosa.** [Trials of treatments for Oidium on Rose *S. pannosa*.]—*Phytiatrie-Phytopharm.*, **8**, 1, pp. 3–8, 1959.

Recording, from the Service de la Protection des Végétaux, Paris, the results of trials in 1955, 1957, and 1958 on 20 vars. (1 yr. old budlings), the authors conclude that micronized S (80% active substance, applied at 300–600 g./hl.) and diphenyl crotonate (25%: 60–100 g./hl.) are equally effective against *S. pannosa* [cf. above] each giving satisfactory control in 1958: spraying should be repeated at 10–12 day intervals and a wetter is indispensible. S spots the foliage and flowers, but is active also against *Marssonina rosae*, which diphenyl crotonate is not.

Di Menna (M. E.). **Yeasts from the leaves of pasture plants.**—*N.Z. J. agric. Res.*, **2**, 2, pp. 394–405, 1 fig., 1 graph, 1959.

Further studies at the Soil Bureau, D.S.I.R., Wellington [cf. **38**, p. 465], have

shown that during most of the year numbers of yeasts (21 spp.) varied between 30,000 and 3,500,000/g. leaves, wet wt., but in the Feb.–Mar. period they reached peaks of up to 100,000,000/g., making up about 1% of the wt. of the leaf sample. At this time up to 90% of the yeast population consisted of red pigmented spp. of *Sporobolomyces* and *Rhodotorula*. The pattern was altered when autumn rain produced fresh pasture growth, both the total numbers and the proportion of red spp. dropping.

SANDER (EVAMARIE). **A study of Red Clover vein mosaic virus.**—*Diss. Abstr.*, **19**, 10, p. 2426, 1959.

At Cornell University the identity of a strain of red clover vein mosaic virus, purified by serial passage through local lesions on *Gomphrena globosa* [**37**, p. 672], was confirmed by host range studies and physical properties. Tobacco was susceptible in certain instances, but *Nicotiana repanda*, *Lotus corniculatus*, and *Capsicum frutescens* were not. The virus did not become systemic in *G. globosa*. In red clover (the best virus source) virus titre was highest in Jan. and lowest in May. With all hosts mechanical transmission was most successful when young leaves were inoculated, and addition of the antioxidant cysteine, at pH 4 or 5, to freshly prepared inocula increased the apparent virus activity, as did clarification by centrifugation before freezing of 1 : 5 aqueous leaf extracts. There were more lesions on *G. globosa* kept in the dark for 24 hr. after inoculation than on plants under continuous light, though darkening beforehand was detrimental. Infection in red clover leaves caused a decrease of the rate of apparent photosynthesis which became more marked as symptom severity increased. Respiration rate also increased, this effect being most pronounced 3 weeks after inoculation. Ash and total N contents, expressed on a dry wt. basis, were also increased. Inclusion bodies, both amorphous and crystalline, were found in leaf hairs of diseased red clover [cf. **38**, p. 503].

GRYLLS (N. E.) & BUTLER (F. C.). **Subterranean Clover stunt, a virus disease of pasture legumes.**—*Aust. J. agric. Res.*, **10**, 2, pp. 145–159, 4 pl. (12 fig.), 1959. [21 ref.]

Further studies [cf. **36**, p. 248] on the virus disease previously referred to as 'clover stunt', but which the authors prefer to name 'subterranean clover stunt' [cf. **37**, p. 672], showed that in southern New South Wales plants developing in the early autumn tend to become infected while those germinating in winter tend to escape. In all seasons infected stands tend to recover owing to the vigorous spring growth of healthy plants while some of the plants with mild symptoms make a partial recovery.

Symptom expression as observed in 1955 varied with the conditions. Where subterranean clover had been harvested for seed and all the dry trash and grass cover had been removed extreme stunting occurred over large areas. Severely stunted plants had a rosetted appearance and a mild, marginal chlorosis with puckering of individual leaflets. On the other hand, where old clover trash or vigorous grass growth afforded protection, stunting was less conspicuous. These plants were spindly and markedly chlorotic, with cupping and puckering of the new growth. This type of symptom was often accompanied by a brilliant crimson to dull purplish colouring of the older leaves.

The virus, which is of the persistent type, was transmitted efficiently by *Aphis craccivora* and less so by *Myzus persicae*. The host range of the virus was found by field observations and glasshouse tests to include a large number of vars. of subterranean clover tested; though Tullarook was markedly resistant, several *Medicago* spp., many legumes introduced from tropical and sub-tropical areas, and *Wistaria sinensis*, *M. lupulina* and *M. hispida* var. *denticulata* were highly susceptible. The virus probably persists in summer-growing annual and perennial legumes.

Evenhuis (H. H.). **De vectoren van het bloemvergroeningsvirus van Klaver.** [The vectors of the virescence virus of Clover.]—*Tijdschr. PlZiekt.*, **64**, 4, pp. 335–336, 1958. [English summary.]

At the Instituut voor Plantenziektenkundig Onderzoek, Wageningen, Netherlands, the virus causing phyllody (virescence) in clover flowers [cf. **37**, p. 243; **38**, p. 586] was transmitted by *Aphrodes albifrons* in 2 instances and by *Macrosteles cristatus* in 1: the number of insects employed was few. In many experiments with *Philaenus spumarius* and *Agallia consobrina* transmission was not achieved.

Koivistoinen (P.) & Pohjakallio (O.). **On the antagonism between Sclerotinia trifoliorum Erikss. and Aerobacter aerogenes (Kruse) Beijerinck.**—*Acta agric. scand.*, **9**, 2, pp. 149–163, 7 fig., 1959.

The clover isolates of *S. trifoliorum* [**38**, p. 66] and *A. aerogenes* investigated at the Dept. of Plant Pathology, University of Helsinki, Finland, appeared to be reciprocally antagonistic to one another. When the reaction of the agar medium was approx. pH 5·5 or less acid, the metabolites of the bacterium were able to stop the growth of the fungus. On glucose clover extract medium on which the fungus formed acids abundantly (extreme pH 2·1), it grew beyond the bacterial colony. The min. pH for the growth of the bacterium was about 4·2. However, the effect of its antibiotic product began to be eliminated at approx. pH 5·5. The antibiotic was not perceptibly volatile at room temp. (approx. 20° C.).

Cabral (R. V. de G.) & Pinto-Ganhão (J. F.). **Uma grava doença do Bersim em Portugal.** [A serious disease of Berseem in Portugal.]—Reprinted from *Agros*, **13**, 2, 3 pp., 1 fig., 1959.

Since the spring of 1957 berseem clover (*Trifolium alexandrinum*) has sustained heavy damage from *Kabatiella caulivora*, which produces dark chestnut-coloured lesions up to several cm. long, becoming necrotic, fissured, and often girdling the stems and sometimes the petioles completely. Occasionally small, well-defined spots of the same colour develop on both leaf surfaces.

Brigham (R. D.). **Effect of Cercospora disease on forage quality of Alfalfa.**—*Agron. J.*, **51**, 6, p. 365, 1959.

At Iowa State College lucerne leaves $\frac{1}{8}$ infected by *C. medicaginis* [**37**, p. 548], following greenhouse inoculation, contained only 60·38% of the crude protein present in healthy leaves, ash and crude fibre increased, and total N was 60%; in leaves with $\frac{1}{4}$ and $\frac{1}{2}$ infection crude protein was 55%. Loss of total N was not proportional to the area covered by the fungus, which could evidently draw N materials from areas surrounding the lesions without actually invading them.

Karchi (Z.). **Study on the resistance in Alfalfa to common leaf spot and on the relation of infection rating to plant color.**—*Diss. Abstr.*, **19**, 10, p. 2424, 1959.

At the University of Minnesota 26 F_1 clones from the 3 crosses between 2 lucerne clones susceptible to leafspot [*Pseudopeziza medicaginis*: cf. **38**, p. 264] and 2 resistant were compared with the parents. Those F_1 plants classified as resistant segregated with a preponderance of resistant plants in the F_2. In all crosses of F_1 clones with the resistant testers progenies were equal in resistance to or more resistant than the F_2 of the same F_1 clones selfed or crossed with susceptible. Susceptible F_1 plants segregated in the F_2 with a preponderance of susceptibles. The evidence suggested that in crosses with the 2 kinds of testers the levels of resistance of the F_1 clones determined the levels of resistance of the progenies. Crosses between clones and progenies of these crossed with resistant testers were useful in evaluating for common leaf spot only when a wide range of mean leaf spot reactions were compared. The progeny mean for crosses between resistant and

susceptible was mostly close to the mid point but always between the parental mid point and the mean of the resistant parent, indicating partial dominance of resistance. Quadruplex, triplex, and duplex genotypes are resistant, and simplex and nulliplex susceptible. There was a slight tendency for resistant plants to be paler, but no evidence to indicate that infection rating and colour intensity were inherently associated.

MATTA (A.). **Ovularia viciae and Botrytis sp. on Vetches in Italy.**—*F.A.O. Pl. Prot. Bull.*, **7**, 5, pp. 69–70, 2 fig., 1959.

In spring 1957 a severe and widespread disease occurred near Turin on vetch (*Vicia villosa*) grown for fodder with Italian ryegrass [*Lolium multiflorum*]. The loss in forage yield was estimated (visually) at 40–50%. Affected plants were severely defoliated at the lower $\frac{3}{4}$ of the stem, many retaining only a tuft of terminal leaves. All the above-ground parts bore small, brown spots, irregularly circular on leaflets but somewhat elongated and often coalescent on stems and pedicels. All the affected organs bore simple, flexuous, rarely septate conidiophores, $50–150 \times 3{\cdot}2–4\,\mu$; conidia measured $10–13 \times 14{\cdot}3–15{\cdot}2\,\mu$. The fungus was identified as *O. viciae* [**26**, p. 341].

Attempts to isolate it on agar media failed, growth being suppressed by a *B.* sp. of *cinerea* type. Inoculation of vetch plants with a mycelial suspension of *O. viciae* gave symptoms differing from those described, but resembling those described on *Vicia* spp. for *B. cinerea* [**23**, p. 347]. It is concluded that the vetch disease is caused by simultaneous infection by *O. viciae* and a *B.* species of the *cinerea* type.

MOHANTY (N. N.). **An undescribed species of Pyrenochaeta on Dolichos biflorus Linn.**—*Indian Phytopath.*, **11**, 1, pp. 85–87, 2 fig., 1958.

D. biflorus, commonly cultivated in Orissa as a pulse and fodder crop, became affected by a severe leaf spot in the Cuttack District in Oct.–Dec. 1955; in subsequent years the disease was present in various intensities in most of the fields there and in the Puri, Balasore, and Dhenkanal Districts. *P. dolichi* Mohanty was cultured from affected material and proved pathogenic at the Section of Mycology and Plant Pathology, Utkal Krushi Mahabidya'laya. The leaf spots are pale brown to almost white in the centre with a dark, reddish-brown to almost black border, circular to irregular, and 2–10 mm. diam. On the under surface they are reddish-brown with a pale brown to whitish centre studded with small, black pycnidia and conidia. The dictyospores (of *Coniosporium*) are dark brown to black, irregularly globose, 30–80 (av. 45–55) μ diam. The yellowish-brown, erumpent, reticulate, spherical to flattened pycnidia are 144–174 μ diam. The dark brown appendages are 0- to 2-septate, straight to slightly curved, slightly narrower towards the tip, tips rounded, $30–120 \times 3–4\,\mu$. The pycnidiospores are hyaline, spherical, oval to short cylindrical, straight to slightly curved, measure $4{\cdot}5–7{\cdot}5 \times 2–3\,\mu$, and emerge from the pycnidia in cirrhi.

MORVAN (G.). **Les maladies à virus du Pommier et des arbres fruitiers à pépins.** [Virus diseases of the Apple tree and pip-fruit trees.]—*Journées fruit. maraîch. d'Avignon, 1958*, pp. 45–54, 9 fig., 1958.

A brief account is given in semi-popular terms of the symptoms and spread of apple witches' broom virus disease, with a list of susceptible vars., followed by a note on apple flat limb virus, and a similar list. Other apple diseases dealt with are those caused by the mosaic, rosette, chat fruit, rough skin, and green crinkle viruses. A brief account is also given of various virus diseases affecting pear trees, including stony pit, and the paper concludes with considerations on the control of virus diseases of fruit trees.

Tunis (W. D.) & Sudds (R. H.). **Field trials with certain n-dodecylguanidine fungicides for the control of Apple scab.**—*Plant Dis. Reptr*, **43**, 4, pp. 483–486, 1959.

At the University of Connecticut Agricultural Experiment Sta., Storrs, good control of apple scab (*Venturia inaequalis*) on McIntosh, Cortland, and Delicious was obtained with 14–16 applications of cyprex 70 W [**38**, pp. 13, 386] in 1957 and 1958 and with E.F. 23441 (n-dodecylguanidine acid phthalate) in 1958, at ½ gal./100. Fruit injury in cyprex plots in 1957 was probably due to too high dosage associated with low temps. at application. Cyprex appeared compatible with a number of insecticides. Percentage scab was under 0·5/tree on leaf and fruit and compared favourably with standard captan (0–0·6), while the controls suffered 39·8–89·4%.

Rich (A. E.) & Richards (M. C.). **The use of McIntosh Apple seedlings in the bioassay of candidate fungicides for control of Apple scab.**—*Plant Dis. Reptr*, **43**, 5, pp. 540–542, 1959.

At New Hampshire Agricultural Station, Durham, apple seedlings with 3–4 leaves, in 4-in. pots, proved very satisfactory for testing fungicides both as protectants and eradicants. Spray inoculation with spores of *Venturia inaequalis* gives a diffuse leaf infection and the fungicides are compared by estimation of the leaf area infected. A close correlation was found with field tests.

Behr (L.). **Experimentelle Untersuchungen über die 'Wollstreifen' des Apfelkerngehäuses.** [Experimental studies on 'wool-streaks' of Apple core.]—*Flora, Jena*, **147**, 2, pp. 167–185, 12 fig., 1959.

A description is given from the Phytopathologisches Institut, Martin Luther University, Halle (Saale), Germany, of a disorder occurring in many apple vars. With increasing lignification the endocarp splits and as a result 'wool streaks', last described by Kuster [cf. **4**, p. 751], appear; they are dense clusters of tube-like elongated, multicellular structures arising from the underlying mesocarp cells. The walls of young 'wool-streaks' are of cellulose; later they may grow thicker, transversed by numerous pit-canals, and give a cutin reaction; sometimes also lignification occurs. These 'wool-streaks' were originally described as intumescences, but from etiological and histological observations they appear to be examples of hyperplasia; they are heteroplasmatic tissues.

Smith (W. H.). **Control of superficial scald in stored Apples.**—*Nature, Lond.*, **183**, 4663, p. 760, 1 graph, 1959.

Alternative control methods were investigated at the D.S.I.R., Ditton Laboratory, Maidstone, Kent, to replace the expensive method hitherto employed against superficial apple scald [cf. **38**, p. 266]. Bramley's Seedling from 3 pickings from 12 trees were stored in air at 0° C.; some were placed at 15·5° for 5 days immediately after harvesting, others were similarly warmed at intervals (but not more than once) until the 30th week. There was a progressive reduction in the percentage and severity of scald with warming at successive intervals from the 2nd to the 12th week and a complete absence in apples warmed at the 16th and 20th weeks: scald was marked on fruit treated in the 30th week. A possible explanation of these results is that combination of substances X and Y [cf. **29**, p. 314] is cumulative and reversible at higher temp. and warming before a sufficient conc. of the toxic substance has accumulated or before it reacts lethally upon the cells prevents scald injury. The method would be useful provided the fruit could be stored at 0° without low-temp. injury or the same effect could be secured at a storage temp. above the critical level for low-temp. injury.

Adams (R. E.) & Tamburo (S. E.). **Treatment of field boxes for the control of post-harvest rots of Peaches and storage rots of Apples.**—*Plant Dis. Reptr*, **43**, 3, pp. 396–400, 1959.

At W. Virginia Agricultural Experiment Station, Morgantown, it was shown that there was as much rot in stored apples and peaches in naturally contaminated boxes as in artificially contaminated ones, the amount being related to the condition of the fruit at the outset. Field boxes used for harvesting and storing Red Delicious [**37**, p. 241] and Golden Delicious apples in 1957 were either naturally contaminated or sprayed with a mixed inoculum of 12 fungi frequently isolated from storage boxes [loc. cit.]. After drying for 4–5 hr. they were sprayed to the point of run-off with 1 of 9 chemicals, each of which provided sufficiently effective control of storage rot at a cost of 25 cents for materials for 100 boxes. With Red Delicious apples, for example, the percentage rot after 2½ months was reduced from 14·5–15·7% in the unsprayed to 3% with glyodin (1 quart/100 gal.).

Similar results were obtained in 1958 with Rome Beauty and Stayman Winesap in dipped or sprayed boxes.

With Hale Haven peaches (1958 only) from 2 localities the least [unidentified] rot occurred in boxes with cardboard liners, 1 and 14·8% 12 days after harvest compared with 44·9 and 74·8% (control) in the 2 localities, respectively. The 4 fungicides tested (captan, zineb, S, and amobam [diammonium ethylene bisdithiocarbamate 42%]) all gave significant decreases in (natural) rotting.

Beraha (L.), Ramsey (G. B.), Smith (M[arion] A.), & Wright (W. R.). **Effects of gamma radiation on brown rot and Rhizopus rot of Peaches and the causal organisms.**—*Phytopathology*, **49**, 6, pp. 354–356, 3 graphs, 1959.

Further details from the University of Chicago, Illinois, are given of information already noticed [**36**, p. 410]. A min. dose of 250,000 rep kept artificially inoculated peaches held at 80–85° F. free from rot by *Rhizopus nigricans* [*R. stolonifer*] for at least 10 days and 200,000 rep inhibited brown rot (*Monilia* [*Sclerotinia*] *fructicola*) for 10 days when untreated fruit had rotted in 5 days. Textural and skin colour abnormalities occurred after 400,000 rep or more, but not at 300,000 rep [cf. **38**, p. 517].

Nyland (G.) & Thomas (H. E.). **A new strain of ring pox virus in Royal Apricot.**—*Phytopathology*, **49**, 6, pp. 338–339, 1 fig., 1959.

This disease, described from the University of California, Davis and Berkeley, and seen in Almeda County in 1954, has symptoms similar to those of apricot ring pox virus on other vars. [cf. **37**, p. 172], though those on the fruit (dark rings, arcs, and spots of necrotic tissue) are much more superficial. In graft inoculation tests the disease was more severe on Royal than on Tilton, the former having been reported hitherto as only a symptomless carrier of normal apricot ring pox virus.

Bovey (R.). **Le dépérissement de l'Abricotier en Valais est il causé par des virus?** [Is the degeneration of the Apricot in Valais caused by viruses?]—*Rev. rom. Agric.*, **15**, 5, pp. 44–47, 5 fig., 1959.

Studies at the Stations Fédérales d'Essais Agricoles de Lausanne, Switzerland, showed that 1 of the types of degeneration is caused by a virus transmissible by grafting [**37**, p. 292]. The symptoms of this disease on both apricot and peach, to which it was also transmitted by grafting from infected apricot, are very similar to those of peach chlorotic leaf roll [peach calico] virus [**35**, p. 688]; possibly the viruses are identical or very closely related.

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